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DISEASES OF THE TONGUE

Plate I



Fig. 1.



Fig. 2



Fig. 3

PLATE I.

- Fig. 1.—Vesicular eruption on the tip of the tongue of an intemperate man.
Fig. 2.—Indentations produced by the teeth in the tongue of a woman,
60 years of age.
Fig. 3.—Soreness and excoriation of the tongue in a youth, 17 years old.
Cause uncertain.

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DISEASES OF THE TONGUE

BY

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ILLUSTRATED WITH EIGHT CHROMO-LITHOGRAPHS AND THIRTY-SIX ENGRAVINGS

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PREFACE.

EVER since I have been a member of the staff of St. Bartholomew's Hospital, I have used the opportunities which the large out-patient practice of the Hospital has given me of collecting notes and drawings of diseases of the tongue. I did not do so at first with any definite intention of publishing them, and certainly not with any intention of writing a work on Diseases of the Tongue. When, however, I was asked by Messrs. Cassell and Company to undertake this task, I accepted, on account of the opportunity it afforded me of bringing my material before the profession much more thoroughly than would probably have been the case had I published the book independently.

In addition to my own cases, I have had the advantage of observing many cases under the care of my colleagues in the Hospital, and have even been permitted to have drawings made of those which I desired. Some of these drawings have been lithographed; but the very large majority of the illustrations have been taken from cases which have been under my own care.

When Sir James Paget learned what work I was engaged in, he was good enough to interest himself in it so far as to look out for me his manuscript notes of several cases, among them one of tuberculous ulcer of the tongue taken about thirty years ago.

I have to thank Mr. Godart for the care which he has

taken in rendering so truthfully the various diseased conditions, sometimes, indeed, in circumstances but little favourable to artistic skill.

Now that the book is passing out of my hands, I am oppressed by the feeling that, in spite of the labour which has been bestowed on it and of the exceptional advantages I have in many ways enjoyed, it does not nearly reach the ideal I had formed for it.

HENRY T. BUTLIN.

Queen Anne Street, W.,
April, 1885.

PREFACE TO THE SECOND EDITION.

WHEN, not long after the appearance of this book, I received notice from the Publishers that they would be obliged if I would prepare a second edition, I was on a holiday on the Continent, and could not undertake the revision until my return home. The book was therefore reprinted without addition or alteration. Some long time has elapsed ere I summoned the courage to undertake the labour of a new edition ; nor should I have done so now had I not found a colleague in Mr. Walter Spencer, who is equally acceptable to Messrs. Cassell and myself. Owing to his efforts, the present work forms a more complete treatise on the diseases of the tongue than the clinical manual which, in the first instance, I was only able to prepare.

The encyclopaedic method has been to some extent maintained, on account of its convenience to the reader ; but, in addition, each disease is treated in a more systematic manner. Various additions have been made, such as the chapter on the anatomy of the tongue ; for this, and for much of the later pathology, Mr. Spencer is responsible. On many points relating to clinical occurrences, particularly on the manner in which cancer first appears on the tongue ; and on questions of operative surgery for malignant disease, the experience I have acquired during the last fifteen years enables me to speak with far greater authority than I ventured to do in 1885. Even now there are many matters, such as

the relation of cancer of the tongue to the lymphatic glands, on which a great deal more experience and research are needed.

Imperfect as we know the book to be, Mr. Spencer and I trust that it may be useful to all those members of our profession who need help in the diagnosis and treatment of the more common diseases of the tongue; or who happen to meet, for the first time, with one of the rarer affections, and would know where and under what circumstances similar cases have been seen before.

HENRY T. BUTLIN.

April, 1900.

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Cause uncertain.

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DISEASES OF THE TONGUE.

CHAPTER I.

THE ANATOMY OF THE TONGUE.

Comparative Anatomy and Embryology—The Thyreoglossal Tract—The Mucous and Salivary Glands—The Middle Line of the Tongue—The Epithelial Surface—The Lingual Tonsil—The Arteries and Veins—The Lymphatics and Lymphatic Glands—The Nerves.

A FULL description of the anatomy and embryology of the tongue is to be found in the text-books devoted to those subjects. It will be of service, however, in this chapter to note the points which are of special interest in relation to the pathology and surgery of the tongue.

1. Comparative Anatomy and Embryology.

The tongue is divided into a lingual muscular organ and a sublingual portion characterised by mucous and salivary glands, lying upon the muscles connecting the lower jaw and hyoid bone. It is the glandular under-tongue which is alone found in the lower vertebrates. In fishes the tongue is represented by the mucous membrane covering the body of the hyoid bone, which is thrown into folds. By down-growths of the mucous membrane simple tubular or compound tubular glands are produced. A section of the tongue, for instance, of a salamander shows that it is covered with simple tubular glands resembling those lining the stomach and intestine. In a large animal, like the crocodile, there is no projecting muscular tongue, but the surface is covered with pits, the openings of these glands. As offshoots from the muscles joining the lower jaw and hyoid bone in the higher vertebrates arise the lingual muscles. The muscular substance makes its way up from behind at the

base and grows forwards, pushing aside the glandular substance, which thus comes to lie below and to the side. At the same time, most of the latter develops into glands of the compound type. The simple tubular glands are like those lining the stomach and intestine, and the compound submaxillary and other gland masses may be compared to the pancreas. In both cases the formation is from the same layer of the blastoderm, viz. the hypoblast or endoderm. Some of the simple glands remain on the dorsum at the base and in front of the junction of the palatoglossal fold, where the orifices are to be seen in large monkeys, such as baboons. (Flower.)

The nerve, which in lower vertebrates supplies the muscles of the front of the neck, rightly called "hypoglossal," is carried up with the muscular development and becomes the motor nerve of the tongue proper. The nerve of the glands and floor of the mouth, the lingual nerve, becomes the sensory nerve of the fore part of the tongue, whilst the sensory nerve of the fauces, the glossopharyngeal, is distributed to the hinder third. The lingual artery, originally carrying blood to the muscles of the floor of the mouth and the glands, continues in the higher vertebrates to run below most of the muscular substance, but gives off upwards towards the surface numerous branches.

The development of the tongue and neighbouring structures in the embryo is connected with the branchial arches and clefts or grooves (Fig. 1.) as set forth in the following table:—

- 1st branchial arch: The lower jaw, the ear ossicles, the tensor palati, the third division of the fifth nerve.
- 1st branchial cleft: The cavities of the outer and middle ear, including the Eustachian tube.
- 1st and 2nd branchial arches, ventrally or anteriorly: The body of the tongue, the middle lobe of the thyroid.
- 2nd branchial arch: Styloid process, stylohyoid ligament, lesser cornu of hyoid bone, styloglossus, levator palati, anterior pillar of fauces, facial nerve (chorda tympani).
- 2nd branchial cleft: Fossæ in the neighbourhood of the tonsil, and the tonsil.
- 2nd and 3rd branchial arches, ventrally or anteriorly: Base of the tongue, muscles of the floor of the mouth, body of the hyoid bone, epiglottis and ary-epiglottic folds and neighbouring fossæ,

thyreoglossal tract, including the inner part of the lateral lobes of the thyroid gland.

3rd branchial arch : Great cornu of hyoid bone, hyoglossus muscle, stylopharyngeus, superior constrictor, glosso-epiglottic folds, internal carotid, glossopharyngeal nerve.

3rd branchial cleft : Thymus.

4th branchial arch : The thyroid cartilage and middle and inferior pharyngeal constrictors, superior laryngeal nerve.

4th branchial cleft : Lateral lobes of the thyroid gland.

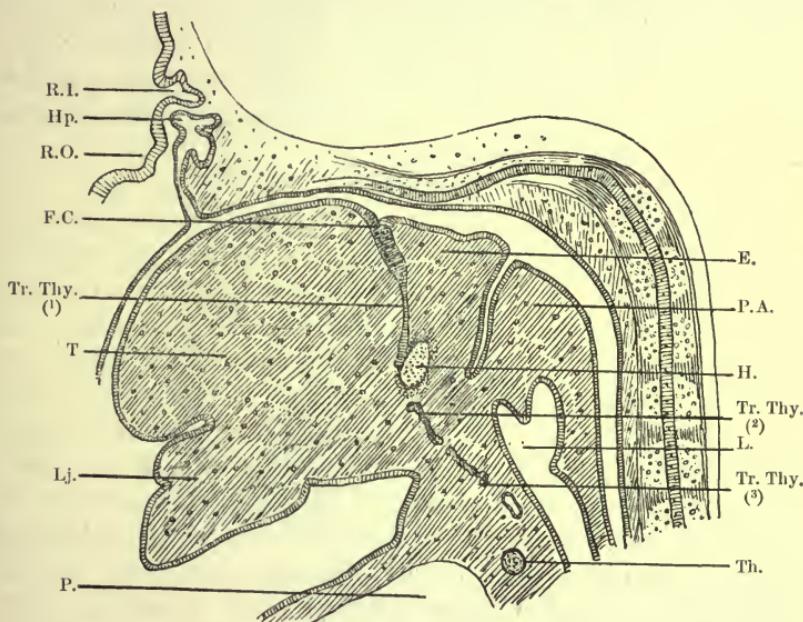


Fig. 1.—DEVELOPMENT OF THE TONGUE.

Drawing of a Sagittal Section through the head of a human embryo. Copied, by the kind permission of Prof. His, from his paper on the Tractus Thyreoglossus.

R. I. Recessus infundibuli. Hp. Hypophysis. R. O. Recessus opticus. F. C. Foramen caecum. Tr. Thy. (1), (2), (3). Tractus Thyreoglossus. T. Tuberculum impar. E. Tubercl^e forming base of tongue and epiglottis. H. Hyoid bone. P. A. Plica aryepiglottica. L. Larynx. P. Pleural cavity. Th. Thymus. L.j. Lip and lower jaw.

The development of the tongue in the human embryo has been fully described by Professor His in his "Anatomy of Human Embryos," and an illustration of his is here reproduced. Below the first branchial or inferior maxillary, or mandibular arch, there is, anteriorly from the erect or human standpoint, ventrally in the prone or animal position, a thickening of mesoblast causing a fusion of the arches and grooves to form a "mesobranchial area." Just below

the lower jaw there arises a projection into the mouth, the "tuberculum impar," which by further growth gives origin to the portion of the tongue in front of the circumvallate papillæ, or lingual **V**.

In the "mesobranchial area" opposite the ends of the second and third branchial arches arises another tubercle to form the base of the tongue and epiglottis. This tubercle, forming the base, grows a little forwards on each side, so as to become forked, and the line of fusion with the "tuberculum impar" in front has an angular form, the lingual **V**, as marked by the circumvallate papillæ. Between the two is the thyreoglossal tract and the foramen cæcum.

2. The Thyreoglossal Tract.

This is the name used by His. The word "duct," thyreoglossal or lingual, is often employed, but there is no evidence of the existence of a duct in any living animal either during embryonic or later life. In man there is at the end of the tract on the dorsum of the tongue, in the angle of the **V**, a small pit about 1 cm. deep, the foramen cæcum. It was described by Morgagni, and later by Bochdalek. The foramen cæcum seems not to be found in other mammals, not even in monkeys, but to be peculiar to man. As to the depth of the foramen cæcum beyond 1 cm. a sinus has been traced by dissection as far as the hyoid bone (Royal College of Surgeons' Museum, Physiological Series, 1526 B.), but there is much doubt whether such dissections may not have been artificial.

The thyreoglossal tract (Fig. 2) marks the line connecting the floor of the mouth with the isthmus and neighbouring portions of the thyroid gland, a separation between the two having taken place during the elongation of the neck of the embryo. The line of the tract runs from the foramen cæcum downwards in the raphé between the geniohyoglossi muscles to the hyoid bone. It is intimately connected with the body of the hyoid bone, also with the periosteum in front and with the thyrohyoid bursa behind. Below the mylohyoid muscle the tract is to be traced from its close connection with the lower and posterior edge of the hyoid bone downwards in front of the thyro-

hyoid ligament to the pyramidal lobe of the thyroid gland beneath the raphé uniting the sternohyoid muscles. The pyramidal lobe is originally double, connected with the isthmus and lateral lobe of either side. Exceptionally it

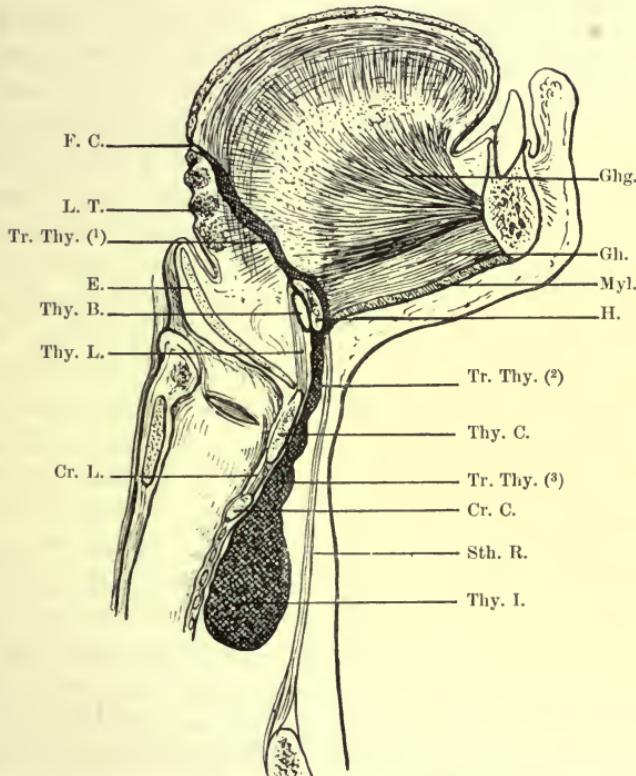


Fig. 2.—DIAGRAM OF THYREOGLOSSAL TRACT AND ITS RELATIONS.

F. C. Foramen cæcum. Tr. Thy. (1) Thyreoglossal tract above hyoid bone. Tr. Thy. (2) Thyreoglossal tract in front of thyrohyoid ligament. Tr. Thy. (3) Pyramidal lobe. Thy. I. Isthmus of thyroid gland. Ghg. Geniohyoglossus muscle. Gh. Genohyoid muscle. Myl. Mylohyoid muscle. L. T. Lingual tonsil. H. Hyoid bone. Thy. B. Thyrohyoid bursa. Thy. L. Thyrohyoid ligament. Sth. R. Sternohyoid raphé. E. Epiglottis. Thy. C. Thyroid cartilage. Cr. C. Cricoid cartilage. Cr. L. Cricoid ligament.

remains so, usually it becomes single and united with the isthmus and with one or other lobe. As has been said, the description of the thyreoglossal tract was made by His from observations on young human embryos. They have been proved of great importance as explaining certain cysts and tumours at the base of the tongue. The statements of His were contested by Kanthack on the ground

that he had not found evidences of the existence of this thyreoglossal tract in a hundred adult tongues and in sixty foetal and children's tongues. But Kanthack's researches were not to the point, and certainly did not invalidate the observations of His. Doubtless, after early embryonic life all traces of the tract do, as a rule, disappear, except the foramen cæcum at one end and the pyramidal lobe projecting up from the thyroid isthmus at the other. But, as will be described subsequently in Chapter XIV., there are found along the course of this tract cysts lined with ciliated epithelium, masses of thyroid gland tissue forming accessory thyroids, noted on post-mortem dissection, or actual tumours seen during life, some solid, others secondary cysts due to the degeneration of thyroid adenomata. Accessory thyroid masses are more easily found during post-mortem dissections in countries where enlargements of the thyroid gland are common, hence the frequency noted by Streckeisen at Basle. Numerous microscopical examinations by different observers have placed it beyond question that these tumours consist of thyroid gland tissue. Not only is it thyroid gland tissue anatomically, but there is complete proof that it is physiologically thyroid gland; for in several cases, as will be mentioned later, a thyroid tumour has been removed from the base of the tongue in the position of the foramen cæcum, after which the patient suffered from myxedema, or cachexia strumipriva, no thyroid gland being perceptible to palpation in the ordinary position. This operative myxedema had to be relieved by administering thyroid gland tabloids.

The original lining of the foregut in the embryo formed from the endoderm or hypoblast is ciliated stratified epithelium. This undergoes a transition in older embryos of higher vertebrates into the stratified squamous epithelium of the mouth, pharynx and oesophagus. But congenital oesophageal cysts are lined with the ciliated stratified epithelium which lined the oesophagus when the diverticulum forming the cyst took place. So also the ciliated cysts found in the course of the thyreoglossal tract have derived their epithelium from the endoderm in the position of the foramen cæcum, and may be found as low as the thyroid isthmus. There

is no sign of any connection of such cysts with the larynx or trachea. (Neumann.)

3. The Mucous and Salivary Glands.

Of the glandular masses opening into the mouth, and arising as outgrowths from the endoderm or hypoblast, four open below the tongue (Fig. 3), but the simple mucous glands at the base behind the circumvallate papillæ, and those in the region of the foliate papillæ in front of the junction of the palato-glossal fold with the tongue, must not be forgotten in connection with certain tumours.

(a) *The Submaxillary Salivary Gland* lies partly on the outer side of the mylohyoid, enclosed by a pouch of fascia which it has pushed out before it in the course of its development, and which forms its special capsule. The rest of the gland with Wharton's duct is behind and on the inner side of the mylohyoid muscle, immediately beneath the mucous membrane, and communicates through the mouth of the pouch-like capsule with the outer part of the gland.

The minor ducts from the various lobules unite into the common duct of Wharton, which runs along the floor of the mouth, to open on the papilla to one side of the frenum (Fig. 4). Subject to much variation it receives near its end one or more ducts from the sublingual gland.

The formation of retention cysts or ranulae, the development of a calculus, or the growth of a tumour, gives rise to different clinical manifestations, according to the parts involved, whether this be the main duct or the buccal portion of the gland immediately beneath the mucous membrane of the floor of the mouth internal to the mylohyoid muscle, or the part of the gland outside the mylohyoid below the angle of the jaw.

The external portion of the submaxillary gland covers a large part of the digastric triangle. The facial artery runs in a groove formed in the capsule, but only its branches enter the gland. This portion of the gland is also intimately connected with neighbouring lymphatic glands. The outer surface of the submaxillary gland, including its capsule, is lobulated and lymphatic gland masses are found closely adherent to the capsule in the folds between the lobules. But further microscopic observations have shown that

lymphadenoid masses are met with inside the capsule and between the lobules and alveoli of the gland itself, which may become infiltrated by cancer. In old patients masses of fat take the place of some of the lobules. The metamorphosis of glandular substance into lymphadenoid material and into fat is a well-known feature of the thymus. No lymph-

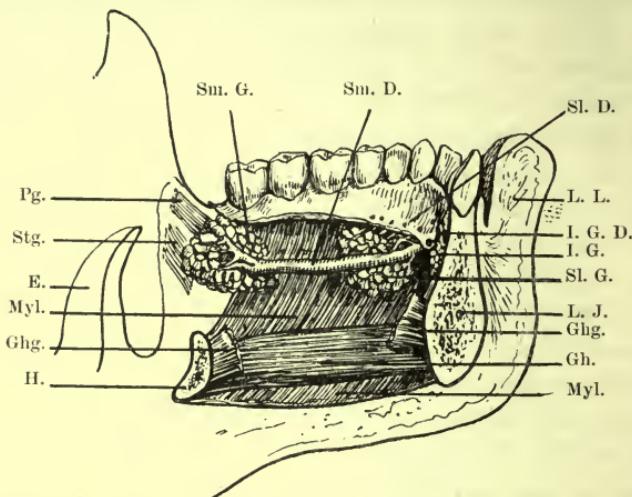


Fig. 3.—DIAGRAM OF ONE SIDE OF THE FLOOR OF THE MOUTH AFTER CUTTING AWAY THE TONGUE.

Sm. G. Submaxillary gland. Sm. D. Submaxillary or Wharton's duct. Sl. G. Sublingual gland. Sl. D. Sublingual ducts, ducts of Rivinus. I. G. Incisive gland. I. G. D. Incisive gland duct. L. L. Lower lip. L. J. Lower jaw. Ghg. Cut-end of geniohyoglossus muscle. Gh. Geniohyoid. Myl. Mylohyoid. Pg. Palatoglossus. Stg. Styloglossus. E. Epiglottis. H. Hyoid bone.

adenoid masses have been observed in the buccal portion of the gland, nor in connection with the sublingual gland.

(b) *The Sublingual Gland.*—It consists of lobules of alveoli much more loosely connected than those of the submaxillary gland, and is not enclosed by any capsule. It lies along the floor of the mouth superficial to and beneath Wharton's duct on the upper surface of the mylohyoid muscle (Fig. 3). It has many ducts, which either open freely on the surface along the ridge running up to the frenum (Fig. 4) or join Wharton's duct. Sometimes the sublingual ducts first collect into a common one, which may have either of the two endings above noted. Retention cysts, calculi, rarely tumours, affect the gland and its ducts. They form in the floor of the mouth

towards the anterior end of the tongue. Wharton's duct may be free, as seen by exciting salivary secretion and watching for a flow from the papilla, also by probing the duct. But when the posterior part of the sublingual gland is affected Wharton's duct may be compressed from the outside. The sublingual gland lies above the mylohyoid muscle, but a

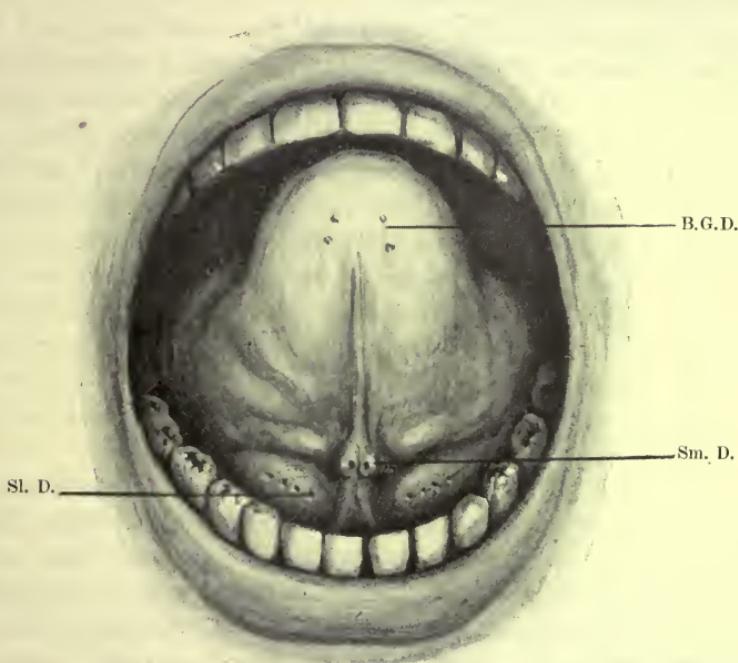


Fig. 4.—ORIFICES OF SALIVARY DUCTS, AFTER MERKEL.

B.G.D. Blandin's gland ducts. Sl. D. Sublingual ducts. Sm. D. Salivary papilla with orifice of submaxillary or Wharton's duct.

careful dissection of the under-surface of the muscle has shown lobules of the sublingual gland herniating between the muscular fibres and appearing on the under-surface of the mylohyoid. Such a hernia of a sublingual lobule has been held to account for the position of certain ranulae, as will be afterwards described.

(c) *The Glands of Blandin.*—In 1823 Blandin described underneath the tip of the tongue, on each side of the middle line, a gland the size and shape of an almond, having vessels and nerves, but quite distinct from the sublingual gland.

The gland is exposed by reflecting the mucous membrane, and in contact with it above are the muscular fibres of the lingualis and styloglossus. If the tip of the tongue be curled up and the surface dried, pits marking the opening of the ducts, two or more on each side, may be seen (Fig. 4). Cysts, calculi, and tumours also form in this gland. Nuhn repeated Blandin's description in 1845.

(d) *The Incisive Gland.*—Merkel says that in front of the salivary caruncle, lying immediately upon the periosteum of the lower jaw, and only a little below the neck of the central incisor tooth, is a small group of glands (Fig. 3), which are constant in occurrence, as described by Suzanne, and are best named glandula incisiva. There are also other small mucous glands about the openings of the submaxillary ducts.

Merkel agrees with others in finding no evidence for the existence of Fleischmann's bursa, which had been alleged to occur in this position. One may, therefore, dismiss it without further mention, and attribute ranulae in this position in front of the sublingual to the group of incisive glands.

4. The Middle Line of the Tongue.

In connection with the origin of epidermal or dermoid cysts, also of other and rarer tumours, it is more than probable that information must be sought for from comparative anatomy and embryology. Nevertheless, at present, not much light on the pathology of such cysts and tumours can be got in this way. These epidermal cysts have no connection with the cysts of the thyreoglossal tract, although the two may have been previously classed together. The thyreoglossal cysts originate from endoderm, and are lined by ciliated epithelium, or have thyroid gland tissue in their wall. The epidermal cysts have all the characters of being derived from detached pieces of epiderm, and may show a lining simply of epidermis, or of it along with appendages of the skin, sebaceous glands and hair, with a more or less thick wall resembling the dermis.

At an extremely early age of the human embryo, before the end of the second week, the epiderm has enclosed the foregut and met in the middle line. Therefore, if it be remnants from this epidermal union which later on give rise to cysts, they may be carried upwards towards the floor

of the mouth away from the skin below the chin by the ingrowth of mesoblast, for the epiderm and endoderm are at first in contact without any intermediate mesoblast. This would account for the existence of such cysts in the middle line above the mylohyoid muscle.

With regard to those epidermal cysts which have a lateral position near the angle of the jaw and the cornu of the hyoid bone, they may form in a similar way in connection with a branchial groove; there are no true clefts in the human embryo.

Another opportunity for the burying of epidermal remnants which may later on form epidermal cysts below the tongue or in the upper part of the neck may occur in connection with the sinus praecervicalis. The first branchial arch, and to a less extent the second arch, grow so much faster than those below that the former overlap the latter, which are, as it were, telescoped and hidden by them. From the middle of the second arch grows down towards the thoracic region a fold compared to a gill-cover or operculum, which, therefore, encloses a deep-seated cavity lined by epiderm, and serves for the development of the thymus. The epithelial nest-cells and the occasional cysts found in the thymus are remains of this epiderm, and perhaps other remnants in the neck may give rise to cysts.

The median raphé represents the skeleton of the tongue of lower vertebrates. Specimens illustrating this are to be seen in the Physiological Series of the College of Surgeons' Museum. There are Hunter's dissections, including his drawing in the catalogue of the skeleton of the chameleon's tongue. Flower's Lectures at the College of Surgeons, in 1872, describe these specimens, including the under-tongue of the lemurs, etc. The typical hyoid bone is formed from the branchial arches by two portions on either side the thyrohyal, or greater cornu, and the kératohyal, or lesser cornu, which join the basihyal, or body of the hyoid. From this projects forwards, in the middle line towards the symphysis of the lower jaw, a rod of bone or cartilage, the glossohyal, or "os entoglossum," or "cartilago entoglossa," the "lingual bone or cartilage" of Hunter. The rod may be firmly fixed or articulate with the body of the

hyoid, as in the turtle. In the chameleon the rod of cartilage aids in the extraordinarily rapid and far protrusion of the tongue. It resembles the notocord in having a sheath, noted by Hunter in the case of the chameleon, and, like the notocord also, it tends to disappear in higher vertebrates, leaving the fibrous septum or median raphé. But towards the deepest part of the raphé, in different positions and under different forms, remains are met with all traceable to a common origin.

The horse has a strong, bony glossohyal projection, making its hyoid bone look like a spur with the rowel turned forwards. The lemurs show a remarkable under-tongue, partly glandular, with openings of the salivary ducts, and above this the remains of the glossohyal skeleton. In the grand galago there projects a tongue-shaped, rather flat body of tough fibrous tissue with a median ridge above and below passing into the frænum. Its edge has finely pointed projections which fit between the incisor teeth and have the appearance of a comb. In the front of the dog's tongue is the "worm" or "style," or "lyssa" or "lytta," "a small worm under the tongue of a dog which, being extracted, is supposed to prevent their becoming mad," which may be coupled with the equally wrong statement that it aids lapping. This glossohyal remnant in the dog is a fusiform body, varying in size from a needle to a crow-quill, composed of fibrous, fatty, and muscular tissue enclosed in a strong sheath. An extreme metamorphosis takes place in some animals, such as the cat, into fat, or the position of the median raphé is occupied by muscular fibres, the azygos linguæ, representing doubtless the muscles originally inserted into the periosteum or perichondrium of the median lingual bone or cartilage. The raphé of the human tongue was described by Blandin in 1823 as blade-like, the upper border being hidden in the muscular substance of the tongue without reaching to the free surface, the lower edge being, as it were, free in the interval between the geniohyoglossi. In front it blends insensibly with the mucous membrane, and behind, becoming more marked, joins with the periosteum of the hyoid bone. In some Blandin found evidences of cartilage, and in two aged subjects

bony nodules were met with in the septum. Recently, Nussbaum and Markowski have examined the septum of the tongue in a number of human foetuses and newborn children, and found a structure surrounded by a capsule in the lower part of the septum, which they describe and figure, particularly in the region of the hyoid bone and near the anterior end. Within the capsule was found fat, also in some short rods or islands of hyaline cartilage, especially near the hyoid bone. They found the septum at an early age composed of much looser connective tissue than that which obtains in the adult, with much fat and numerous blood-vessels. Occasionally fatty and cartilaginous masses were found in the adult septum.

Such remnants may quite possibly be the source of tumours.

5. The Epithelial Surface.

The stratified epithelium which covers the tongue has characteristics in common with the skin on the one hand, and with mucous membrane on the other. It has many affections similar to those of the skin, and it may be affected concurrently in skin diseases. Thickenings of the corneous layers occur, such as is normal in the skin of the palm and sole. Papillomata and epitheliomata are the characteristic new growths in each case. It is not, however, complete epidermis; it is not derived from the original epiderm, but by transition from the endoderm, and has none of the appendages of the skin. Like mucous membrane, it is normally moist, extremely vascular, and freely connected with lymphatics and lymphatic glands. The epithelial surface of the tongue has some connection with the alimentary canal, by which alterations are produced; but such changes on the surface of the tongue cannot be held to show that similar changes are going on in the mucous membrane of the alimentary canal.

Slight variations from the normal in the papillary surface of the tongue in the direction of hypertrophy or atrophy are not necessarily indicative of disease, but may be spontaneous varieties, approximating types found in the lower animals. Thus, Flower notes in the anthropoid apes very large soft papillae with pointed apices on each side of the dorsal surface of the base of the tongue in front of the

palatoglossal fold. Such conditions in man, where the site of neuralgic pain, have been termed papillomata. The filiform papille may be very long, as in the baboon (*Cynocephalus anubis*), where they are almost hair-like, and directed backwards. On the other hand, by the slight development of the filiform papillæ, the tongue may be abnormally smooth. The fungiform and circumvallate papillæ are likewise subject to variations.

The fimbriated folds and the irregular tags of mucous membrane found on either side of the frenum and over the sublingual gland may be compared with the pectinated folds mentioned as covering the front of the under-tongue of the lemurs.

6. The Lingual Tonsil.

There is especially developed in man, at the junction of the mouth and nose with the pharynx, a ring of lymphatic gland tissue, the faucial tonsils on each side, the so-called pharyngeal tonsil on the dorsal aspect, and at the opposite part of the ring, on the base of the tongue, a mass of similar lymphadenoid tissue, the lingual tonsil.

The base of the tongue is best seen by the laryngoscopic mirror, without drawing out the tongue forcibly. It is only imperfectly seen when the front of the tongue is depressed. In the dead subject the follicles to be described are less prominent, whitish and imperfectly defined, owing to the absence of vascularisation.

From the circumvallate papillæ backwards to the glosso-epiglottic fold, and extending to the tonsil on each side, the surface of the base of the tongue is partly smooth, partly raised by vascular prominences. The prominences are mostly spherical, 1 to 5 mm. in diameter, one hemisphere projecting from the surface, with a depression 1 mm. broad at the pole, which is the opening both of the follicle and of the duct of mucous glands. The follicles may be few and discrete, or collected into larger masses, with slit-like orifices. They are said to vary from 34 to 102 in number. The existence of these follicles was mentioned by Wharton and Morgagni, and included by them with the tonsils. The first full description is due to Kölliker.

According to Stöhr, the lymphatic follicles develop in

human embryos during the eighth month in the neighbourhood of the mouth of the ducts of tubular mucous glands. Leucocytes wander out from the veins into the fibrillar connective tissue around the duct just below the epithelial surface, and convert it into retiform tissue. The leucocytes collect in the meshwork, and multiplying, form the follicle surrounding the crypt formed by the mouth, the gland duct. Outside the follicle the connective tissue becomes compressed into a capsule. From this adenoid tissue white cells are continually escaping into the crypt, and so into the mouth. Like the faucial tonsils, the lingual tonsil is subject to wide individual variations: to hypertrophy, follicular inflammation and abscess, tumour formation. When the follicles are prominent they tend to hide the upper border of the epiglottis as seen in the laryngeal mirror, and the glossoepiglottic sinus is lost to view, even when the tongue is at the same time drawn out, or a high note sounded.

7. The Arteries and Veins in Connection with the Tongue.

(A.) The Arteries.

The common carotid artery divides opposite the upper border of the thyroid cartilage, lower in long, thin-necked subjects, and higher in those who are short-necked. The bifurcation is so very easily felt in thin subjects that it might possibly be taken for a gland lying on the artery. The external carotid begins nearer the middle line than the internal, which first has a deeper course behind the external, separated from it by the styloglossus and stylopharyngeus muscles. The external carotid bends slightly inwards in its course up to the angle of the jaw, and is at first superficial, covered only by skin, platysma, the deep fascia, and scarcely at all by the aponeurotic edge of the sternomastoid. It is here situated in the angle formed by the edge of the sternomastoid, and by the posterior belly of the digastric and stylohyoid muscle, and gives origin to the superior thyroid, and then to the lingual.

The Lingual Artery.—Upon the division of the skin, platysma and deep fascia, and the retraction of the sternomastoid backwards, and the posterior belly of the digastric forwards, the artery may be exposed, just behind the tip of the great cornu of the hyoid bone, which forms the guide

to the artery. Its distance of origin above the superior thyroid is on an average 12 mm. Soon after its origin it gives off its hyoid branch, which runs along the bone. The artery may be tied in this position, the chief objection being the nearness to the external carotid, which is the more in favour of secondary haemorrhage, especially when the wound in the neck cannot be kept aseptic owing to its communication with the mouth. The lingual artery is commonly tied in the digastric, alternatively, the hypoglossal or lingual triangle—objection has been taken to all three names (Fig. 7). To expose the triangle the head is extended and turned to the opposite side; then it is necessary to raise the platysma and deep fascia with the veins, to be afterwards mentioned, and to strongly hook up the submaxillary salivary and adjacent lymphatic glands. Thus there is exposed the obtuse angle made by the two bellies of the digastric. Within the angle is the hyoglossus muscle, and the hypoglossal nerve appears from underneath the posterior belly of the digastric and stylohyoid muscles, and crosses the hyoglossus, to disappear beneath the posterior edge of the mylohyoid muscle. If the fibres of the hyoglossus are divided just below the hypoglossal nerve, the lingual artery will practically always be met with running beneath the hyoglossus muscle, having behind it the muscular wall of the pharynx and, a few millimetres forwards, the geniohyoglossus. The artery runs for a short distance parallel to the hyoid bone and just above it. A ligature applied in this position is usually on the proximal side of the origin of the dorsalis linguae branch. After the artery passes underneath the posterior border of the mylohyoid, its course is within the mouth, where it gives origin to the dorsalis linguae, sublingual and terminal ranine branches. The position of the artery within the mouth varies according to the position of the tongue. Three positions of the tongue are, as regards the artery's course, of interest: (a) when the tongue lies at rest in the mouth, (b) when the tongue is forcibly drawn out of the mouth, (c) when the tip of the tongue is curled upwards.

(a) When the tongue lies at rest in the mouth, the lingual artery as viewed from the side takes an arched course from the apex of the great cornu to the tip of the

tongue; the more the tongue is retracted, the higher the arch. From about the highest part of the arch the dorsalis linguae branch is given off. When a finger is passed down to the epiglottis, and the tip of the great cornu felt through the pharyngeal wall, then the artery is arching forwards between the finger and the angle of the lower jaw, and by pressing the finger outwards the artery is compressed. Thus, haemorrhage from the cut end of the artery may be temporarily controlled.

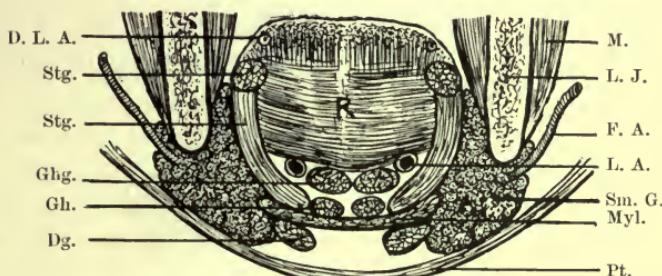


Fig. 5.—DIAGRAM OF A TRANSVERSE SECTION OF THE TONGUE AT THE ANTERIOR EDGE OF THE MASSETERS.

L. J. Lower jaw. L. A. Lingual artery. F. A. Facial artery. D. L. A. Dorsalis linguae artery. M. Masseter. Stg. Styloglossus. Ghg. Geniohyoglossus. Gh. Geniohyoid. Myl. Mylohyoid. Dg. Digastric. Pt. Platysma. Sm. G. Submaxillary gland.

(b) When the tongue is forcibly drawn out of the mouth the hyoid bone is pulled upwards, and the course of the artery becomes approximately a straight line, from the apex of the great cornu to the tip of the tongue, the two arteries converging to this point. The artery is found immediately beneath the denser muscular substance, separated from the middle line by the geniohyoglossus muscle (Fig. 5). It is here surrounded by a loose connective tissue, which allows of the cut end of the artery being drawn out a little. Running close to the artery on the outer side is the lingual nerve.

(c) When the tip of the tongue is curled or held up, there appear spread out on either side of the middle line the ranine veins and their venules. Immediately beneath the vein—exposed, therefore, by removing the mucous membrane and the vein—runs the ranine artery, accompanied on the outer side by the lingual nerve (Fig. 6). The nearer the arteries are to the tip, the more they approach one another.

Moreover, with the tip of the tongue drawn up, the sublingual gland beneath the mucous membrane is also lifted. In the superficial part of the gland thus rendered prominent runs the sublingual branch, which may thus be easily included in any wound, surgical or accidental, involving the frenum and adjacent mucous membrane of the floor.

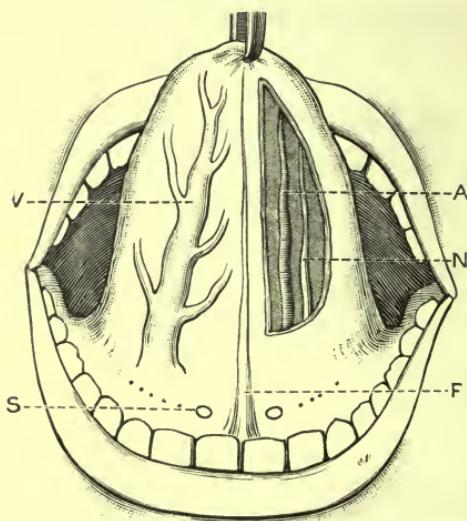


Fig. 6.—DIAGRAM OF THE UNDER SURFACE OF THE TIP OF THE TONGUE WHEN DRAWN OUT AND HELD UP.

V. Ranine vein. A. Ranine artery. N. Lingual nerve. F. Frenum. S. Salivary papilla.

Abnormalities of the Lingual Artery.—The lingual artery is one of the most constant of all the arteries, both as regards its origin and its course. It may arise a little lower than usual in common with the superior thyroid, but as it then ascends into the digastric triangle, there is no change in the operation for its ligature. It may arise higher than usual in common with the facial artery. In this case the artery has to descend to pass under the mylohyoid, and is therefore found in the digastric triangle higher than usual, at the level or above the level of the hypoglossal nerve. (Gruber.) Occasional instances of other anomalies have been met with in the dissecting room, but although surgeons may have missed the artery at operations, there is no convincing

account of the artery having been really absent from the digastric triangle. The anomalies found may be explained by the enlargement of some usually fine twig to take the place of the undeveloped main vessel. In Shepherd's case this was the normal hyoid branch. The artery arose, in common with the superior thyroid opposite the upper border of the thyroid cartilage, passed upwards on the thyrohyoid muscle, crossed the hyoid bone anterior to the lesser cornu, then upwards beneath the anterior belly of the digastric muscle, and pierced the hyoglossus muscle. A more common anomaly is the enlargement of the twig which runs along the hypoglossal nerve, superficial to the hyoglossus. This was found by Zuckerkandl and Funke, and Croly has noticed it six times. The artery arises from the external carotid about its usual level, and runs over the hyoglossus parallel to and a little below the hypoglossal nerve, until, at its inner edge beneath the mylohyoid, it reaches the outer surface of the geniohyoglossus. But in Hyrtl's case the artery passed over the hyoglossus under the anterior belly of the digastric on the mylohyoid until it reached the chin, where it pierced this muscle and passed backwards between the geniohyoid and the hyoglossus externally and the geniohyoglossus internally. Here there was the enlargement of a submental twig. Louth *père* is quoted as having found a very small lingual ending in the depth of the tongue, a sublingual ranine branch being supplied by the internal maxillary artery. The sublingual branch may be substituted by the submental branch of the facial.

The External Maxillary or Facial Artery.—The facial artery arises from the external carotid close above or even in common with the lingual artery, and takes a tortuous course before it becomes superficial upon the lower jaw at the anterior border of the masseter muscle. Its course is from the level of the great cornu of the hyoid bone or just above, at first upwards underneath the posterior belly of the digastric and the stylohyoid muscle, then underneath the overhanging submaxillary gland. The artery does not actually penetrate the capsule of the gland, but at the hinder part of the gland, where it and the beginnings of Wharton's duct hook round the mylohyoid, the capsule encloses the artery in a sheath.

Here the artery gives off its submental branch, which runs along under the lower border of the jaw, enclosed by the anterior part of the gland. The facial artery is seen when the deep fascia has been divided and the submaxillary gland hooked up over the ramus of the jaw. The artery is thus stretched out, and extends from the posterior belly of the digastric and stylohyoid across to the gland, behind the border of the mylohyoid and above the course of the hypoglossal nerve.

(B.) The Veins from the Tongue.

The veins passing from the tongue and floor of the mouth across the submaxillary region run between the layers of fascia or beneath the deep fascia, and have irregular communications, as can be found on anatomical examination. But the general experience of surgeons leads to the conclusion that greater irregularities prevail than even anatomical descriptions give. This is no doubt largely due to the dilatation of small veins and the formation of communicating venous plexuses, as a result of disease.

The veins may be divided into three groups, according as they mainly join the internal jugular, external jugular, and anterior jugular respectively. The facial and lingual veins joining the internal jugular about the level of the hyoid bone are the chief ones. The anterior facial vein, receiving blood from the face and chin, sometimes runs in front of the submaxillary gland, superficially between the layers of fascia, sometimes is united to the gland and lies beneath the deep fascia. It receives veins from the submaxillary gland, also submental veins across the digastric triangle. The lingual vein is formed by the sublingual, which runs across the digastric triangle just below the hypoglossal nerve. Venæ comites come from the tongue and run along the course of the artery backwards, receiving the dorsalis linguæ underneath the hyoglossus, and then, joining with the more superficial sublingual, compose the lingual vein which enters the internal jugular separately or in conjunction with the facial vein. The superior thyroid vein joins the lingual or facial, or both, before entering the internal jugular, and is therefore met with in the larger submaxillary operations. Submental veins tend towards the anterior jugular, but

also communicate with the facial or internal jugular. Veins from the base of the tongue and submaxillary glands, also communications with the anterior facial, cross the sternomastoid to the external jugular.

8. The Lymphatics and Lymphatic Glands.

The most prominent question in connection with diseases of the tongue—viz. the greater prolongation of life after operations for cancer—concerns the lymphatics and lymphatic glands, and how far the knife of the surgeon should go in the removal of glands not obviously diseased.

At first sight the question looks an almost hopeless one when it is found that fine injections into any point of the tongue can be made to penetrate into the lymphatic glands through the lymphatics in every direction. But, of course, this free intercommunication must be studied in connection with the peculiarities which cancer exhibits in slipping through the lymphatics like emboli to lodge in glands, and many more exact observations are required to connect the starting points of cancer with the glands first infected. At any rate, both anatomical and clinical observations emphasize the great importance of the fact that the main lymph channels from the tongue have their junction in the chain of glands lying on the internal jugular vein, about the level of the hyoid bone and the bifurcation of the carotid.

A full description of the lymphatics and lymphatic glands was given by Sappey, to whose work, until recently, sufficient attention had not been given by surgeons. It has been confirmed by Küttnér. The lymphatics of the epithelium of the dorsal surface of the tongue and floor of the mouth can be injected by plunging in a fine needle beneath the epithelium at any point, except as regards the base of the tongue behind the circumvallate papillæ, from which the lymphatics pass to the tonsillar region, and the communication with the rest of the tongue is not so free. The fine capillaries are collected into lymphatics with frequent communications, which, after running in the submucous tissue, dip down deeper towards the lymphatic glands. Lymphatics from the muscular substance take a similar course: some of the main lymphatics run across the surface of the *hyoglossus*, others follow the course of the *lingual artery*.

Submaxillary Lymphatic Glands (Fig. 7).—There are several glands in the loose connective tissue of the digastric triangle between the lower jaw and the mylohyoid muscle. They are met with as far forwards as the anterior belly of the digastric and backwards up to the parotid. They may lie

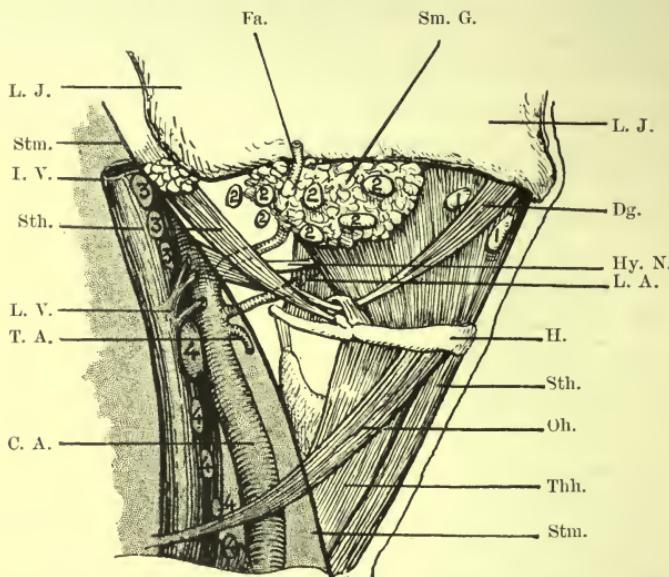


Fig. 7.—DIAGRAM OF THE LYMPHATIC GLANDS AND OTHER STRUCTURES BELOW THE JAW AND IN THE NECK.

Lymphatic glands: (1) (1) Submental. (2) (2) Submaxillary. (3) (4) Upper deep cervical glands, called also sternomastoid or carotid or jugular glands; the highest gland, marked (4), is especially infected early. C. A. Common carotid artery. T. A. Superior thyroid. L. A. Lingual, passing under hyoglossus and mylohyoid muscles. Fa. Facial. Hy. N. Hypoglossal nerve. I.V. Internal jugular vein joined by L.V. Lingual vein, also at the same place by the facial vein above and the superior thyroid vein below. L. J. Lower jaw. Sm. G. Submaxillary gland. Stm. Anterior border of the sternomastoid. Dg. Digastric muscle. Sth. Stylohyoid. Oh. Omohyoid. Thh. Thyrohyoid. H. Hyoid bone.

adherent to the salivary gland capsule or between its fold. As mentioned before, lymphatic gland substance is met with inside the capsule and between the lobules. These glands receive lymphatics from the whole of the margin of the tongue as far as the anterior pillar of the fauces, from the median portion of the front half of the tongue, from the under-surface of the tip and from the floor of the mouth.

Lingual Glands.—Small glands are met with between the geniohyoglossi, also on the outer surfaces of the muscles. They are on the course of the lymphatics, but are not end

stations, and the epitheliomatous infection is not arrested in them.

Submental Glands.—One or two glands lie in the submental triangle, receiving lymph from the region of the frænum, thence efferent channels lead to the submaxillary glands.

Parotid Lymphatic Glands.—The lower end of the parotid salivary gland, where it is overlapped by the submaxillary, contains lymphadenoid masses which receive lymphatics, especially from the soft palate.

Upper deep Cervical Glands (Glandulae cervicales profundæ superiores).—A chain of glands lies generally on the internal jugular vein (Fig. 7), overlapped by the anterior edge of the sternomastoid muscle, less often directly over the internal or external carotid, but almost always over the common carotid near its bifurcation. They extend from the level of the bifurcation of the carotid upwards, and may do so nearly up to the skull. These glands are the chief ones of the tongue. They are end stations on the course of the lymphatics, where epitheliomatous infection becomes arrested. Lymphatics come to these glands from the whole tongue and floor of the mouth, the anterior and posterior pillar of the fauces, the tonsil, the dorsal surface of the soft palate, as well as from the pharynx.

Lower deep Cervical or Supraclavicular Glands (Glandulae cervicales profunda inferioris).—The highest of these glands lies at the point where the internal jugular vein is crossed by the omohyoid, and they extend as a chain downwards behind the clavicle; from them the afferent lymphatics join the internal jugular and subclavian veins independently of the thoracic duct. They receive afferent lymphatics from the upper cervical glands. There are also lymphatics which come direct from the tongue to these glands, chiefly from the region of the frænum and adjacent part of the floor of the mouth as far back as the middle of the sublingual gland, and sometimes from the dorsum of the tongue to the same extent.

9. Nerves of the Tongue.

Hypoglossal Nerve.—The muscles of the tongue are connected with the opposite motor area of the brain at the

lower end of the fissure of Rolando. The connection is through the corona radiata, internal capsule and crista, and then the fibres cross to the opposite hypoglossal nucleus, crossing below the level at which the fibres going to the facial nucleus cross, so that paralysis of the tongue may occur on the opposite side to that of the face. The different cases of paralysis of the hypoglossal nerve may be grouped according as the part involved is the nucleus, the root passing through the condylar foramen, the nerve running close to the atlas vertebra, then emerging deep in the neck and closely connected with the vagus; next crossing the carotid artery, the nerve appears in the digastric triangle, dividing there to go to the several muscles.

Vasomotor efferent fibres pass from the cervical sympathetic to the smaller branches of the lingual artery in the muscles, *i.e.* the arterioles, by means of which the constriction and dilatation of these vessels can vary the blood flow.

Afferent Nerves of Common Sensation and of Taste.—The afferent nerves of the tongue are complex. The **lingual nerve** is the nerve of common sensation and of taste to the anterior two-thirds of the tongue. The fibres of common sensation are connected with the fifth nerve through the Gasserian ganglion. It is not certain whether the taste fibres have a similar course, or whether they reach the lingual nerve through the chorda tympani, or come from the glossopharyngeal through Jacobson's nerve, the tympanic plexus, the vidian nerve, and otic ganglion. Pain felt in the ear in cases of disease of the tongue, and conversely, pain in the tongue from irritation of the ear, *e.g.* by wax in the auditory meatus, is explained as due to the connection of the lingual and auriculo-temporal nerves, both belonging to the third division of the fifth.

The **chorda tympani** nerve is apparently a nerve of taste in man, for when the nerve is touched as it crosses the ear sensations of taste are experienced, and the sense of taste is blunted in cases of facial paralysis when the nerve is involved in the aquæductus fallopii. It may, by joining the lingual, be the means of adding taste fibres to that nerve. The chorda tympani may arise by the pars intermedia of

Wrissberg from the upper end of the glossopharyngeal nucleus, and so all the taste fibres of the tongue have their source in one centre.

The glossopharyngeal nerve is the nerve of common sensation and of taste to the posterior third of the tongue. The pain felt in the ear in consequence of disease of the base of the tongue may be due to its being referred to Jacobson's nerve in the tympanum. Supposing the taste fibres to run in the glossopharyngeal, they would have their origin in connection with the root of that nerve. It has been supposed, however, that the fifth nerve is the nerve of taste, and that the glossopharyngeal obtains taste fibres from the fifth through the vidian or petrosal nerves, the tympanic plexus, and Jacobson's nerve.

The superior laryngeal nerve sends fibres to the base of the tongue and epiglottis, hence the ease with which disease in this position may give rise to reflex cough, hic-cough, or vomiting. It may also explain the ease with which spasm of the glottis and pharynx may be caused by sudden depression of the base of the tongue. On the other hand, the excitation of the respiratory movements when the tongue is forcibly drawn upon, may be due to stimulation through this nerve of the respiratory centre. (Laborde.) Obstinate hiccup, too, has been relieved by traction on the tongue. (Lépine.)

CHAPTER II.

THE CONGENITAL DEFECTS OF THE TONGUE.

Absence (so-called) of the Tongue—Bifid or Split Tongue—Congenital Ankyloglossia, Adherent Tongue, or Tongue-tie: (a) Exceptional Occurrence, Bad Effects of Unnecessary Division of the Frenum; (b) followed by Haemorrhage, Tongue Swallowing and Asphyxia, Macroglossia; (c) Division of the Frænum; (d) Treatment of Accidents following Improper Division—Excessive Mobility: (a) Tongue Swallowing, (b) Tongue Sinking Back, (c) Extreme Length of the Tongue—Congenitally Enlarged Papillæ.

MALFORMATIONS of the tongue are due to an arrest at some stage in the course of the development of the tongue, including the persistence of union with the palate, owing to the incomplete opening made between the primitive mouth and the gullet. Defects of any kind are rare, the most frequent being spoken of clinically as abnormal fixation of the tip of the tongue, ankyloglossia, or tongue-tie. The still rarer malformations have been named "absence of the tongue," or "fusion of the tongue with the floor of the mouth." None of these names is connected with the origin of the condition. In reference to the process of development, briefly mentioned in the foregoing chapter, it is the "tuberculum impar" which is the site of all the congenital defects. If it falls short by a little of growing forwards to produce the projecting tip, "tongue-tie" is seen; if it is entirely arrested in its growth, we have the "absence of the tongue," *i.e.* of the anterior projecting part. No case has been described of the absence of the base of the tongue as formed behind the lingual V. It was evidently present in Jussieu's case, for the girl could speak plainly and distinctly except for a few letters, and the same applies to other cases. In the relative absence of the "tuberculum impar," the forked anterior part of the "tubercl^e of the base" may grow forwards and produce the "bifid tongue." Some of these

defects have occurred with malformations of the upper and lower jaws, especially in monsters.

1. **Absence (so-called) of the Tongue, i.e. arrested Development of the Tuberculum Impar of His.**

This is a condition so rare that all works on diseases of the tongue quote the case related by Jussieu in 1718. This really appears to be the first case on record, for the best writers on congenital defects neither relate other cases nor give references to works in which they may be found. One may believe that Weber had seen a case, since he says that the place of the absent tongue is occupied by two movable nodules, whereas the patient described by Jussieu had only one nodule. However, it cannot be supposed that Weber could have really seen so rare a condition and not have carefully recorded it.

At the age of fifteen years the girl described by Jussieu had, in place of tongue, a small elevation in the middle of the floor of the mouth, about three or four lines in height. It was to a certain extent movable, the muscles at the base of the tongue being fairly developed, and was evidently very useful in speaking and in swallowing. Speech was very little affected by the absence of the tongue; it was, indeed, so clear that no one would have suspected that so serious a defect existed. There was a little difficulty with the letters (in French) c, f, g, l, n, r, s, t, x, y, z. This circumstance, which excited great surprise and doubt in the beginning of the eighteenth century, would not be considered so remarkable now. That speech may be retained when the entire tongue has been removed has been proved so often of late years that the fact has ceased to appear wonderful. Mastication and the swallowing of solid food were the only acts which were really difficult to this patient: mastication because she was prevented by the absence of the tongue from collecting the food from about the teeth and between the teeth and cheeks; deglutition of solids because she could not carry the food back to the pharynx as usual with the tongue. She was therefore obliged occasionally to supply the defect by using her fingers to gather in the food and thrust it to the back of her mouth. She could spit by aid of the mylohyoid. She could not suck as an infant

except when the mother compressed the breast at the same time. The nerves which supply the tongue with taste and touch appear to have been perfect so far as the maintenance of these functions was concerned. It is probable that the lingual branch of the fifth and the anterior portion of the glossopharyngeal passed into the mucous membrane of the floor of the mouth, and terminated there in normal filaments in or immediately beneath the epithelium.

We have sometimes been inclined to wonder whether this was a true case of congenital absence of the tongue, or whether it was not rather a case of the kind described by Aurran and Roland de Bélebat of loss of the tongue as the result of some destructive disease. Several cases are described in old medical literature of loss of the tongue from small-pox, an accident apparently much more frequent in past times, when small-pox was more destructive than it has been in the present century. The appearances recorded in some of these cases do not differ widely from those recorded by Jussieu. But Jussieu was acquainted with Roland de Bélebat's case, and specifically mentions that the girl was born so. Moreover, the situation of the small elevation in the floor of the mouth of the girl accords with the theory of arrest of development; for the first appearance of the tongue in the foetus is, as first described by Kölliker, a projection or swelling on the middle of the inner aspect of the first branchial arch. This projection unites at a later period of foetal life with a second projection proceeding from the second arch. The development of the tongue, therefore, in the case related by Jussieu points to an absolute failure of the projection from the inferior maxillary arch, and to a partial development of that which proceeded from the second pharyngeal arch.

Duplouy, under the title "Complete Fusion of the Tongue with the Floor of the Mouth," gives a somewhat similar case. The tongue of a child aged two and a half months did not project at all from the floor of the mouth, and no muscular substance was to be felt with the finger, whilst the hinder part of the tongue was normal. The child was in danger of dying of starvation, as it could not suck well. After a long discussion in the French Surgical Society, the general

opinion was against any operation, and recommendations were made as to feeding by spoon, by extra long teat, or by oesophagus tubes.

2. Bifid or Split Tongue.

Children are occasionally born with a longitudinal fissure, which divides the fore part of the tongue into two equal parts, and which extends, in some instances, a considerable distance back towards the root. The condition is peculiar, but, as has frequently been pointed out, is analogous to the natural condition of the tongue in certain of the lower animals. The seal among mammals has a bifid tongue; the raven among birds; but the division of the fore part of the tongue into two reaches its height in reptiles, among which many of the snakes, with their extremely forked tongues, may be taken as examples. A bifid tongue does not appear to affect the functions of the organ in any serious degree: therefore, no operation need be undertaken to unite the two halves. But an operation may be asked for in consequence of the ugliness of the deformity, and if it be desired, there is no reason why it should not be performed, provided the patient is strong and healthy. The opposed surfaces of the cleft must be pared and brought together with sutures. There is not any serious bleeding, and the wound will probably heal by first intention.

The manner in which the splitting of the tongue is to be accounted for by an arrest of the "tuberculum impar" and the growing forward of the forked "tubercle of the base" has been already referred to.

A bifid or cleft tongue has been seen with a cleft lower lip, also with an ill-developed lower jaw, with or without harelip and cleft palate. The upper and lower jaws may be, however, quite well formed. Ahlfeld has also observed deep clefts of the face occurring with bifid tongues. A bifid or split tongue must, of course, be distinguished from a so-called "double tongue," produced by a ranula under the tongue or by enlargement of the sublingual salivary glands.

Ahlfeld suggested that the simpler or slighter conditions—mere notches—at the tip of the tongue were connected with a short frenum, and this is probably the case. Septours described an anencephalic monster in which, besides

an extensive harelip and cleft palate, the tongue was divided into three portions. The two lower rested on the floor of the mouth, which they entirely filled, one on either side. Each had a sort of frenum, beyond which they projected a little. A third portion was fixed in front to the nasal septum between the cleft of the palate, and projected between the lips. On its under-surface were papillæ and fine down hairs. Here we have the forked tubercle of the base forming the two masses on the floor, and the tuberculum impar adherent to the upper jaw owing to the incomplete separation of the primitive septum between the mouth and pharynx. In Griffiths' case of a male infant only the posterior part of the tongue was developed, so that it looked like the stump of a tongue after amputation. The stump was closely applied to a cleft in the hard palate; the soft palate was adherent to the naso-pharynx, so that there was no opening of the posterior nares. The cheeks were partly adherent to the gums, and the gums to one another. The child cried and sucked the finger, but could not take the breast.

3. Congenital Ankyloglossia, Adherent Tongue, or Tongue-tie.

(a) Children are born with the tip of the tongue adherent to the floor of the mouth owing to a very short frenum and folds of mucous membrane on each side of the frenum. This is due to the projecting portion of the tongue being incompletely developed from the tuberculum impar. In many of the slighter cases the development has merely lagged behind, and will be completed as the child grows after birth. And this backward state of the tip at birth is doubtless the source of the superstitions which have surrounded the subject of tongue-tie. The real persisting cases are excessively rare; most surgeons have never seen a congenital case. This question of excessive rarity of tongue-tie has to be emphasized on account of the harm done by the unnecessary division of the frenum, with the results to be recorded: the septic ulcer, with its inevitable puckered scar, leaving the tongue more fixed than before; the fatal haemorrhages; the falling back of the tongue, causing "tongue-swallowing" and suffocation, and later, macroglossia or the impairment of the future singing voice. The superstition is a hoary one. Celsus describes it

and warns against injury of the ranine veins. It is one of the few errors made by Ambrose Paré, who advises, after division of the frænum, that the finger should be inserted under the tongue to lift it up, a procedure which has been the death of many infants. Fabrizio d'Acquapendente was the first to attack this evil custom, saying that the midwives of his day kept a finger-nail sharp for the purpose of tearing through the frænum and stripping up the tongue of *all* new-born children. It has been disclosed concerning fatal cases of haemorrhage or tongue-swallowing that the midwife has been accustomed in a great number of cases to snip through the frænum with a pair of scissors and strip up the tongue. It cannot be denied also that many practitioners have too often done the same unnecessarily and carelessly, to the injury of the child. The doctor is pressed by the mother to operate, and as the operation seems very trivial and is easily performed, if there is the least doubt whether the frænum should be divided, he yields to the pressure put upon him.

(b) *Fatal Haemorrhage after Division of the Frænum.*—The following case is described by Burton. A non-certificated midwife, who said that she had frequently performed the operation, using always sharp-pointed scissors, divided the frænum of a male child one hour after birth, making a cut between half an inch and three-quarters of an inch long, commencing to the right of the middle line and extending to the left. Bleeding was noticed a few hours afterwards, the blood coming out of the child's mouth. The next day bleeding continued, and dark blood was passed by the bowel. Two days after birth the child was seen by Dr. Burton. Arterial bleeding was going on, and two ligatures were applied. The child had become very anaemic; it passed more blood by the bowel, and died rather suddenly on the third day. Post mortem all the organs were found healthy, but very anaemic. In the stomach and intestines, throughout almost their whole length, was much semi-fluid blood. A ligature was seen occluding both the left ranine artery and vein. The jury at the inquest found "Death by misadventure."

Reboul described a similar case in which a doctor had divided the frænum a few hours after birth. There was continued oozing in spite of all treatment by pressure,

cautery, etc. The ulcer got larger, there was increasing pallor, melæna, and finally death on the sixth day. Many more such cases have been noted.

The division of the frænum is a common cause of asphyxia and tongue-swallowing. Two of the three cases described by Petit in 1742 died with all the symptoms of suffocation within a few hours after the frænum had been divided; and other similar cases have happened. Macroglossia has followed as a direct result of division of the frænum. In Sédillot's case the macroglossia was seen in a boy aged nine, in whom the frænum had been divided five years before to facilitate speech. In Döllinger's case of a man aged twenty-one, the macroglossia dated from the division of the frænum at the age of two.

(e) However rare, it cannot be doubted that there are cases of tongue-tie needing division. Joachim describes cases, and quotes those of Potter, where a number of children of the same family could not suck until the frænum was divided. It may be said, nevertheless, that such cases could have been brought up by hand.

About other cases there is still more doubt. Dieffenbach, in 1841, described division as a remedy for stuttering. His first case soon relapsed, and no success was obtained by surgeons who followed. Makuen, in the United States, has recently published three cases: one, a youth aged nineteen, who had never been able to utter four consecutive syllables intelligibly in his life. A year after the division of the frænum, including the attachments of the geniohyoglossi, he could declaim a scene from Shakespeare better than the average. The second case was that of a boy who could not protrude the tongue beyond the teeth. After division of the frænum he could protrude it and talk plainly. A third case occurred in a woman aged twenty-five. There must be some nervous element in such cases.

Broca describes a case of superior ankyloglossia where the tongue adhered to the palate, and a separation had to be made before the child could take its food.

Division of the Frænum.—It follows, therefore, from the above, that the frænum ought to be divided in an infant only after due deliberation. It ought not to be considered a

trivial operation, and no midwife nor other unqualified person should be allowed either to cut the frænum with scissors or to tear it through with the finger-nail.

The cutting of the frænum is performed by placing the fore and second finger of the left hand beneath the front of the tongue, one on each side of the frænum, so as to raise up the tip and tighten the band to be divided. The grooved sound or director with its flat split handle was invented by Petit, and is perpetuated by instrument makers. But it requires a longish frænum to enter the slit, *i.e.* a kind of case which does not require the division. Petit's idea was to cut underneath when the frænum was in the slit, the ranine artery and vein being thus protected from injury by the flat surface. Having raised up the tip so as to make the band tense, a minute snip should be made through the mucous membrane, close to the inner surface of the lower jaw. The insertions of the geniohyoglossi should never be divided, nor should the tongue be stripped up by the finger. The old plan was to put the child to the breast immediately, the sucking being supposed to arrest the hæmorrhage by pressure.

(d) *Treatment of the Accidents following excessive Division of the Frænum.*—A surgeon may be called upon to treat as an urgent case an infant with hæmorrhage and threatened tongue-swallowing, owing to wrongful division of the frænum. He should first put a silk ligature through the tip of the tongue, and draw it forwards. If there appears to be little but oozing, he may gently wipe out the mouth and clean the wound, dust on a little iodoform powder, and insert a little strip of gauze. The drawing forwards of the tongue will then press the gauze against the lower jaw. The ligature through the tongue, as well as the end of the strip of gauze, should be fixed to a lightly applied ordinary chin-bandage. If the hæmorrhage is more severe, it may be necessary, after obtaining assistance, to give a little chloroform, open and clear out the mouth, and then ligature the bleeding point, using the greatest care or the friable tissue will tear further. The cautery should not be used, for secondary hæmorrhage may occur when the eschars separate.

4. Excessive Mobility, Tongue-swallowing.

(a) As there are cases in which children are born with

too short or too tight a frænum, so there appear to be cases in which children are born with too long a frænum. At first sight, it does not seem probable that such a condition as too long a frænum would attract the attention either of the doctor or of the relatives of the child; but the records of some of the cases show that this is a much more serious defect than the other. Too short a frænum has never, so far as we are aware, been directly the cause of the death of a child, but several children are reported to have died because the frænum was too long.

Attention was first drawn to the subject by Petit in 1742, in a memoir to the Académie Royale des Sciences, in which he related three cases of children in whom the frænum was so long that it failed to exercise its due influence in fixing the fore part of the tongue, so that two of them, drawing the tongue back into the pharynx in the act of swallowing, died suffocated. The third child was reared with difficulty by keeping a continual watch over it. Since 1742 several papers have been published on the subject, some of them containing cases in point, but the defect or the danger of death from the defect does not appear to be at all common; or, if it is common, it must be very generally overlooked, and the deaths must be attributed to some other cause. Even in several of the cases in which children have died from swallowing the tongue, the primary defect was not congenital: the frænum was probably natural at birth, but it was divided within a very short time after birth, and its natural bearing on the tongue was destroyed. Two of the three cases related by Petit were cases of this kind, in which the operation was performed a few hours after the children were born. The evidence is founded on post-mortem examination of several patients, and the description of the manner of death and of the appearances observed after death is very clear, and points decidedly to suffocation by the tongue.

Petit's two tiny patients died with all the symptoms of suffocation within a few hours after the frænum had been divided, and Petit made the examination by splitting open the cheek in such a manner as not to disturb the relation of the parts within the mouth. He found the throat com-

pletely filled by the tongue, the tip of which was turned back over the dorsum, and fixed, like a wedge, in the upper part of the gullet. The obstruction to the larynx was so complete that no air could possibly have passed into the lungs.

(b) *Sinking Back of the Tongue*.—A case recorded by Fairbairn differed from those by Petit. The child had a cleft palate, and whenever more than a very small quantity of liquid was dropped into its mouth, it was attacked by cough and threatened with suffocation. When it was two days old it died, apparently from suffocation. At the autopsy the tongue was found to be short and thick, with a very defective frænum. The tip was not retroverted, but the whole tongue lay so far back that only the tip was visible at the back of the mouth. The dorsum was applied against the back wall of the pharynx, and the base pressed down on the epiglottis and arytenoid cartilages in such a manner that the entrance to the larynx was completely blocked. Fairbairn said that he had had another somewhat similar case, but the infant had been reared.

Hennig mentions two cases in which children between three and four months old died suffocated during a paroxysm of whooping-cough, apparently from sucking the tongue into the pharynx in the long act of inspiration which occurs between the fits of coughing, but neither of these cases had been seen by himself. They occurred in the practice of a fellow-practitioner, by whom they were related to Hennig. Hennig refers to the drawing back of the tongue in sleep and in catarrh, and speaks of it as if it were not uncommon, and a source of danger to children fed for the first time with a spoon. His paper is worthy to be read, but he appears to attribute too great importance to the possibility of suffocation from drawing or sinking back of the tongue.

Sinking back of the tongue is known to occur after operations in which the attachment of the geniohyoglossi muscles has been separated from the lower jaw. The accident is now so far recognised that precautions are taken to prevent it in those cases in which the symphysis has been removed, or in which a large operation, implicating the anterior attach-

ments of the tongue, has been practised. With these conditions in mind, it is not very difficult to imagine such an accident as that described by Fairbairn. Ingals has related a case of a very dyspeptic and hysterical woman, twenty-eight years old, who suffered on several occasions from attacks of suffocation, and who said that her tongue seemed much farther back in her mouth than she could voluntarily put it, and that the tip was pressed up against the palate, and seemed curled over on the dorsum. But the inverted position of the fore part of the tongue was not proved by the doctor, and was only a supposition on the part of the patient, whose evidence can hardly be regarded as very valuable.

The sudden depression of the tongue of a child in order to examine its fauces has set up severe respiratory spasm lasting an hour or two, and one fatal case of convulsions followed the sudden depression of the tongue. It is a wise rule to make a child say "a," if possible, when depressing the tongue. (Vergel.)

Tongue-sucking is a vice to which mentally deficient and idiot children may become addicted. Lindner's paper has illustrations of this and finger and lip sucking. It may produce caries of the teeth and even dislocation of the jaw.

With regard to *treatment*, if a child is suddenly suffocated there is no time to procure medical assistance. But if a child is threatened with suffocation, and escapes on the first occasion, and the cause of the threatened death is discovered to lie in an ability to "swallow" the tongue, it is possible that careful management may succeed in averting the catastrophe. Both Petit and Fairbairn mention cases in which children were exposed to the chance of death from this accident, but the patients were successfully reared. The attendant in each case was very cautious, in feeding the child, not to give it too large a quantity at any one time; and when the access of suffocation was observed, it was arrested by putting the finger into the child's mouth and, presumably, correcting the position of the tongue. Whenever the child whose case is recorded by Petit was seemingly inclined to suck back its tongue, it was supplied with a substitute in the form of the teat or the finger. It may

probably be taken as a rule in the treatment of these rare cases that the children should be fed with the breast either of the mother or a wet-nurse, if it is possible; and, failing this, with an artificial teat in preference to a spoon. In such a case as that related by Fairbairn it would not be possible, in all probability, to carry out this recommendation, for the infant had a cleft of the palate. If the child is attacked by suffocation, either during or between the intervals of feeding, the attendant should at once pass a finger into the mouth, between the tongue and palate, and, passing it far back, draw the tongue forward. There is no difficulty in doing this if the finger is passed sufficiently far back. The woman whose case is described by Ingals cured herself in this manner; but too great weight must not be attached to this case, on account of the element of hysteria which prevailed so largely, and also of the great doubt which must be felt of the exact conditions which obtained.

(c) *Extreme length of the tongue* must be regarded rather as a congenital peculiarity than as a defect. Instances of this condition are the two quoted by Clarke from Fournier. One of the persons was a lady whose tongue was so long that when it was protruded it hung over the teeth in folds; the other was a girl who could touch her chest with the tip of her protruded tongue. Other persons have been able to touch the point of the chin, the tongue being protruded as freely as that of a dog. The extreme length of the tongue in these persons does not appear to have been attended with any great inconvenience, and they are only mentioned that nothing which is of interest in connection with this subject may be omitted.

In relation to this matter, it may be mentioned that, both in ancient and in modern times, defect of speech, particularly an imperfect and slovenly articulation, has been attributed to too great length and size of the tongue. This impression may be correct. But, on the other hand, it will be observed in the section on hypertrophy of the tongue that even a considerable enlargement, so great that the organ protrudes habitually from the mouth, does not very greatly impair the speech.

5. Congenitally-enlarged Papillæ.

Many of the warts and warty growths of the tongue undoubtedly owe their origin to hypertrophy of one or more of the natural papillæ of the tongue, but we have met with one instance in which there was hypertrophy of certain of the papillæ all over the papillary aspect of the dorsum, with the production of tuft-like growths which did not resemble the usual warty growths, and which could not well be classed among the true tumours of the tongue. They are conditions which may be compared with that existing in some animals. Others may be early stages of partial macroglossia.

CHAPTER III.

ACCIDENTS TO THE TONGUE AND ACQUIRED DEFORMITIES.

Burns and Scalds—Stings and Snakebites—Wounds of the Tongue: (*a*) Bites; (*b*) Hæmorrhage from Wounds; (*c*) Bullet Wounds; (*d*) Wounds of the Tongue involving the Large Vessels of the Neck—Foreign Bodies in the Tongue—Acquired Ankyloglossia, or Tongue-tie—Results of Removal of Part of the Tongue—Acquired Excessive Mobility.

1. Burns and Scalds.

Trivial *burns* of the tongue are of very frequent occurrence, both in children and in adults, from taking food which is too hot into the mouth. The burnt spot is painful and very tender for a while, and is redder and smoother than the rest of the surface of the tongue, or, perhaps, it is actually excoriated. The material is seldom so hot or retained so long within the mouth as to produce sloughing of the cutis vera of the mucous membrane or even to raise up the cuticle, but the superficial portions of the papillæ are destroyed, and falling, leave a smooth area. In the course of a few hours, and almost always by the following day, the tenderness has disappeared, the burnt spot has lost its extra red colour, and the appendages of the papillæ begin to form again. Such burns as these seldom call for treatment; but if the soreness of the tongue continues longer than usual, borax and honey may be painted over the burnt area, or an astringent lotion may be used, or a gargle of chlorate of potash at frequent intervals until the annoyance ceases to be felt.

The severest burns are those which are produced by chemical agents, by the mineral acids, the caustic alkalies, and corrosive sublimate. In these burns the tongue rarely suffers so much as the back part of the mouth and fauces. Indeed, in many cases, the fluid is thrown so far back in

the mouth that the tongue escapes almost untouched. When the tongue has been touched by the material, the effect is not usually that which would be produced by simple extreme heat, but varies according to the material which has been used, and partly with the length of time during which the tongue has been in contact with it. Thus:

Corrosive sublimate produces in most instances a very characteristic condition of the tongue, which is white and shrivelled, with great enlargement of the papillæ at the base.

In sulphuric acid poisoning the tongue is usually white and glazed, and the surface looks sometimes like soaked parchment, sometimes like white paint. In a short time it becomes grey or brownish-grey, is much swollen and often excoriated.

In nitric acid poisoning the tongue is generally swollen and of a citron colour; the mucous membrane is soft and easily peels off.

In hydrochloric acid poisoning it is also swollen and often dry.

After oxalic acid has been taken it is generally swollen and covered with a thick white coat, as if it had been scalded.

Carbolic acid renders the mucous membrane white and hard.

Potash and soda soften the mucous membrane, which is easily detached. The tongue, in poisoning by these caustics, is often bluish-red, or may be yellowish-brown. Ammonia colours it white, and excoriation is common when either of the three has been taken.

The other poisons, as a rule, produce no alteration in the appearance of the tongue in cases of acute poisoning. Almost the only exception is the tincture of cantharides, which causes the tongue to swell and produces excoriation.

It need scarcely be remarked that the action of most of these powerful irritants and caustics is not limited to the tongue, but is apparent on all parts of the interior of the mouth. The appearance of the tongue is thoroughly characteristic only in poisoning by corrosive sublimate. In such a case the white and shrivelled aspect of the tongue

may be of great value in attempting to discover the poison which has been taken.

Scalds of the tongue and of the whole of the interior of the mouth are not very uncommon, especially in children ; and in children of the lower orders they are frequently produced by an attempt on the part of the child to drink out of the spout of the kettle. Usually only a very small quantity of the fluid enters the mouth, but the tiny drop of water and, much more, the steam, are sufficient to produce disastrous consequences. The effect on the tongue, however, is one of the least of these. The real danger to life lies almost always in the damage to the air passages. The tongue swells and becomes for a while exceedingly painful and tender, so that the taking of food in any form is difficult. The surface of the tongue is very red, and sometimes blebs are formed. The swelling and distress, so far as the tongue is concerned, rapidly pass off, and the patient is often able to swallow without obvious discomfort in the course of a few hours. Yet no direct treatment is adopted for the relief of the buccal scald, partly on account of the difficulty of carrying it out in the cases of young children, partly, and probably chiefly, because it is notorious that the buccal trouble rapidly subsides without direct local treatment. The warm and moist atmosphere which is usually maintained in the immediate neighbourhood of these little patients may have something to do with the rapid recovery of the mouth ; but probably the youth of the patients and the excellence of the interior of the mouth as a sick chamber for the injured parts have more to do with it. It has been suggested that the blebs which sometimes form upon the tongue and over the interior of the mouth should be broken down with the finger ; but we have never seen a case in which this appeared necessary or in any way likely to relieve the patient.

Slight burns in the mouth occur in adults smoking cigars or cigarettes. The size and depth of the burn is apparently most trivial, yet chronic ulcers have followed from which malignant disease arose, or the scar after healing has years later been the seat of epithelioma. Such a growth commenced on the tongue of a woman where a drop of

caustic potash had fallen a long while before. This tendency is a great reason for not using the actual cautery to slight affections of the tongue.

At an inquest held at St. Bartholomew's Hospital on a woman, aged thirty-eight, who had been given to drink, it transpired that she had bought a halfpennyworth of gunpowder, put it into her mouth, and set fire to it. On entering the room, which was full of smoke, the woman was found rolling on the floor. Blood was oozing from her mouth, and the tongue and roof of her mouth were blackened. She died the next day. Eichhorst mentions the case of a lighthouse-keeper who was looking up at the burning lighthouse when he received fatal injuries from a stream of molten lead which fell into his mouth and down into his stomach.

In adults the pain of small burns in the mouth may be relieved by sucking ice, also by painting on a solution of cocaine.

2. Stings and Bites of Insects and Reptiles.

The results of stings and of the bites of reptiles are referred to in the chapter on Inflammation. The tongue is very rarely bitten by reptiles, but instances have been recorded in which snakes have been incautiously handled, and a bite of the tongue has been the result. The effect will then vary according to the poisonous or non-poisonous character of the snake. Stings of insects are much more common: the insects are taken into the mouth concealed in fruit, and serious injuries have in this manner been produced by wasps, bees, and other stinging insects. The bite may prove fatal within a few minutes if the tongue is the bitten part, on account of its vascularity and its large lymphatic supply; or the inflammation abates without actually producing the threatened suffocation, and the patient is speedily relieved. An indurated patch has marked the site of the sting for some time. Gangrene and suppuration are equally unusual events in the course of these inflammations, however severe they are. The patient immediately becomes faint, then collapsed and unconscious, and the respiration rapidly fails. In a less severe type acute œdema of the glottis follows upon the swelling of the tongue, and tracheotomy is necessary to save life.

The treatment does not differ materially from that which is proper in other cases of acute parenchymatous inflammation, but incisions are very seldom needful. F. Clarke recommends that the mouth should be very frequently washed out with an alkaline solution in the hope of neutralising the formic acid, which is the active principle of the poison, and he gives the preference to a weak solution of ammonia. It would be more effectual to inject a weak solution of ammonia into the site of the sting. Active treatment will also be required if the patient is collapsed.

3. Wounds of the Tongue.

The commonest wounds are those made by the teeth. Severe wounds are occasioned by bullets and by teeth or pieces of the jaw driven into the tongue. There are also cases in which a pipe-stem has caused fatal injuries.

(a) *Bites of the Tongue.*—As a rule, bites of the tongue are not serious accidents, but cases are on record in which they have been the cause of death. Dr. Wickham Legg has recorded cases of haemophilia in which a bite of the tongue proved fatal from continuous haemorrhage. Severe bites are occasioned in the course of epileptic fits, also during puerperal eclampsia. During the stage of clonic movements the tongue is forcibly protruded, and immediately following this the jaw closes. In the College of Surgeons' Museum, specimen No. 2,266, is the tongue of an epileptic idiot, aged sixteen, who bit off the end of his tongue in a fit. Haemorrhage occurred for two days, the mouth became foetid, sloughs formed, the patient became weaker and died. The specimen shows that both ranine arteries had been divided. Epileptics have been found in the morning pulseless from severe haemorrhage, having bitten the tongue during sleep. So also in puerperal eclampsia severe injury to the tongue may occur unless the patient is watched.

Many severe bites have occurred in children from falling on the chin. Fatal haemorrhage was occasioned in a child aged fifteen months who fell out of a chair; there was a tendency to profuse bleeding in other members of the family. Hobbs saw a man who was working with his tongue out, when he was struck under the chin and nearly bit his tongue off, but it united well after suture. An extraordinary

occurrence from a medico-legal standpoint is reported by Makuna. A drunken man seized his father by the throat, so forcing him to protrude his tongue, which he seized with his teeth, inflicting a deep jagged wound. Another curious bite was seen by Nægeli in an old woman with a single pointed incisor, which had transfixed and held forwards the tip of the tongue, causing grave trouble with deglutition.

The tongue may be severely lacerated by a compound fracture of the jaw. Norgate saw a young man who had been so severely crushed by a waggon-wheel that the tongue had been almost severed at its base by the sharp edge of the fragments of the lower jaw. Only a few shreds had to be divided in order to complete the amputation. The bleeding was free, but not severe, and healing took place quickly.

In order to prevent a person in a fit biting his tongue a piece of stick or handle of a knife or spatula is pushed between the teeth. An interdental splint has been devised to be worn by epileptics at night to prevent tongue-biting. In all cases, however lacerated and however small the connection, an attempt should be made by suture to fit the lacerated portions accurately into position. When there is no displacement of the bitten-off tip there is no special indication for suturing. Horsehair sutures may be inserted after cleaning the wound and ligaturing any bleeding point. This may be done under cocain, or chloroform may be required. Afterwards a mouthwash of permanganate of potash should be constantly used. Liquid food will be required for a few days. The horsehair sutures are left till they drop out or become loose. If seen later the edges of the wound should be pared, and the refreshed surfaces sutured together.

(b) *Hæmorrhage from Wounds of the Tongue*.—To speak once for all of the **hæmorrhage** from wounds of the tongue which is not due to the presence of foreign bodies, it should be a rule of practice to arrest the hæmorrhage *thoroughly* as soon after the accident as possible. If the wound is far forward, there is usually no difficulty in doing so; but if the wound is far back, a difficult and serious operation may be required. In such a case let the bleeding

be temporarily arrested by the pressure of the finger on the wound, or a piece of lint or gauze between the finger and the wound until the measures for the permanent arrest have been considered and arranged. Then place the patient in a good light, administer chloroform if possible, and open the mouth thoroughly with a strong gag, draw out the tongue by two stout threads passed through its tip, one on either side, and carefully examine the wound. The time lost in these manœuvres is in most cases time gained, for the loss of blood during them will be much less than if half measures are adopted, and the chances of permanently arresting the hæmorrhage are vastly increased. If, when the wound is thus exposed, a bleeding vessel can be seen, it will of course be ligatured; but if blood wells up from a deep and perhaps almost punctured wound, the wound should, without hesitation, be enlarged until the vessel is in view. If on examination it appears certain that the hæmorrhage is not arterial, but is the result of general oozing or of wounds of veins, the bringing together of the edges of the wound by deep sutures, after the clots and other matters have been removed, will suffice to arrest the bleeding. In all cases of hæmorrhage from the tongue, when the hæmorrhage is thought to be arterial, it must be borne in mind that the larger arteries are deeply placed. They cannot be wounded by a superficial incision, and a punctured wound will have to be followed up to a considerable depth. Ligature of the lingual artery in the neck is, however, very rarely needful in cases of primary hæmorrhage from the tongue.

It may be objected to the practice which has just been recommended, that although it is not difficult to carry out in a large hospital or in a large city, where the necessary instruments and the requisite assistance can be certainly and speedily procured, the case is far otherwise in a small town or a widely-extended country practice. This is quite true, and, in the latter case, if the hæmorrhage is so severe as to threaten life, so much the worse for the patient. Yet, even in these conditions, much may be done to avert the catastrophe by timely and sensible measures. A surgeon, single-handed, or with lay assistance, may examine the wound, turning out the clot, and cleansing the surfaces in

a thoroughly good light, and he may succeed in finding and putting a ligature round the bleeding vessel, particularly if the patient has fortitude enough to remain quiet during the necessarily painful and tedious operation. But if this fails, and the bleeding still continues, the best hope is in pressure, kept up as long as may be necessary by the finger of the patient or some other person on a strip of gauze thrust deep down in the interior of the wound. By this means the haemorrhage may at least be arrested until further assistance can be procured.

Secondary haemorrhage is very unusual from simple wounds of the tongue, unless they are complicated by the presence of foreign bodies. It is then fraught with the most serious danger to the patient, and may not improbably end fatally. In this case, as in the case of primary haemorrhage, the only reasonable chance of success lies in the complete exposure of the wound and an examination under favourable conditions. If this is desirable in dealing with primary haemorrhage, it is doubly desirable in treating secondary haemorrhage, for all the difficulties are increased. If the bleeding vessel cannot be discovered, or if it is in such a condition that a ligature cannot be applied, severe and repeated secondary haemorrhage may necessitate ligature of the lingual artery. And, when the wound is far back in the tongue, and implicates the tonsil or other of the adjacent structures, the question may arise of ligaturing the external or even the common carotid artery.

Traumatic fissures and ulcers of the tongue are described in Chapter IX.

(e) *Bullet-wound of the Tongue.*—Rifle bullets of high velocity are mostly fatal owing to the extensive laceration of the tongue and the wounding of the large vessels in the neck. The cases caused by bullets of low velocity from inferior pistols mostly come under the notice of the surgeon.

The bullet may lodge in the tongue and be extracted with difficulty, or in the pharyngeal wall, or it may drive a tooth in front of it. In Baker's case a probe passed into the wound of entry on the dorsum of the tongue, and came out in the pharynx just in front of the epiglottis. Six days afterwards the bullet was passed per anum. Rangé describes

the case of a child, aged four, into whose open mouth a boy fired. The bullet passed through the base of the tongue and pharynx, and buried itself in the neck in the region of the sixth and seventh vertebrae. Severe haemorrhage occurred on the sixth day, which was followed by an abscess discharging into the pharynx, and following this there was suppuration deep in the neck. The illness lasted three months, and healing finally took place without the bullet being recovered. The treatment of bullet-wounds includes the removal of the bullet or tooth, if possible, always remembering the classical rule, of being prepared for a gush of blood on extracting a foreign body. Deep-seated haemorrhage might require ligature of the lingual in the neck.

(d) *Wound of the Tongue and, through it, of the Internal Carotid Artery and Jugular Vein by a Pipe-stem.*—Two remarkable cases occurred almost at the same time in two London hospitals. A man, aged twenty, was admitted to Guy's Hospital, under Bransby Cooper. Three days before he had been smoking, when the elbow of a companion struck the bowl of the pipe and drove the stem into his tongue, breaking off three inches. He fainted on account of the pain, and a surgeon found a wound passing obliquely from the right to the left side, which he probed, but struck nothing. No bleeding occurred, but he sought admission for increasing swelling of the tongue and throat, which impeded speech and swallowing. On the fifth day the swelling was less, and the wound noted in the tongue had closed. On the sixth day he vomited a pint of blood, and this vomiting recurred, so that by the twelfth day he was very anaemic. No wound could be made out in the mouth from which the blood could come, but there was still considerable swelling of the tongue and fauces, and the jaw could not be opened widely, so that the view was very incomplete. He continued to vomit blood, and died on the fifteenth day, after bringing up blood and clot. Post mortem : The wound had transfixed the tongue from left to right, and both openings had closed, but in the track of the wound within the tongue was a piece of pipe-stem two and a half inches in length. Opposite the wound of exit on the left side was a small irregular opening, just behind and below the left tonsil, from which injection

material came freely when the carotids were injected. This was doubtless from the internal jugular, as the clinical course of the case indicated; but there was no dissection made to clear up the point. A curiously similar and more startling case occurred to Hamilton at the London Hospital. A man, aged thirty, was smoking, when he fell and drove his pipe-stem into his tongue. The tongue began to swell, and gargles were used. On the fourth day he was taken to the London Hospital, with the tongue enormously enlarged. The dresser lanced the tongue and let out an ounce of pus. As the respiration became increasingly difficult, Hamilton was sent for, who probed the abscess cavity and struck the pipe-stem, and, seizing it with forceps, pulled out a length of four inches. This was followed by a torrent of blood, and the patient died in less than a minute in spite of the compression of one and then of both carotids. Post mortem: It was found that the pipe-stem had entered the right tip of the tongue, had emerged on the opposite side near the root, and then, passing beneath the left tonsil, had gone completely through the left internal carotid and internal jugular vein.

4. Foreign Bodies in the Tongue. (*See also under "Actinomycosis."*)

In connection with the last section, it will not be amiss to draw attention to the symptoms produced by the presence of foreign bodies in the tongue.

When the nature of the accident has rendered it possible that a foreign body has been embedded in the substance of the tongue, it is scarcely necessary to say it should be very carefully sought for, and removed as speedily as possible. But it sometimes happens that a foreign body is not suspected, and, either on account of its small size or of the depth at which it lies, there is no hardness over it. It remains embedded, and for a long time unsuspected, but the wound does not heal. In the course of a few days the first serious symptom may be a slight attack of secondary haemorrhage, and this alone ought to excite suspicion. If haemorrhage occurs it is generally repeated, and if the body is not soon extracted and the source of the haemorrhage discovered and treated, a serious termination of the case may result. In the absence of haemorrhage, inflammation may be excited by the

presence of the body, and a hard, circumscribed, indolent tumour is formed, through which a sinus sometimes leads down to the exciting cause. In some cases, much more severe inflammation is excited, suppuration occurs, openings are formed, and sinuses remain, through which fungous granulations protrude. Under these circumstances the foreign body may be spontaneously discharged, especially if it is small. But it rarely excites so much disturbance, and more commonly remains buried in the indolent inflammatory tumour which has been formed around it. Many cases are on record in which a foreign body has remained thus hidden for several years, and sometimes the symptoms have been very singular. Perhaps no case is more interesting in this respect than one which is quoted by Legouest from Manget of a person in whose tongue a ball had been embedded six years before it was removed. During the whole of the six years the patient stammered excessively, and the stammering ceased after the removal of the ball. Seiler relates a case which is worthy to be borne in mind. The patient was a man, twenty-eight years old, who had suffered from soreness of the throat, cough, slight hoarseness, difficult and painful deglutition, and white, starch-like expectoration for several weeks, and who was growing worse. He was examined with the laryngoscope, and the usual appearances of chronic laryngitis were observed; but, in addition, a thin, glistening needle-like body, protruded about half an inch from the surface of the tongue, near the glosso-epiglottic fold. The body was easily removed with a curved pair of forceps, and proved to be a bristle of a tooth-brush, somewhat swelled by long maceration. The symptoms of laryngitis quickly disappeared.

Gibb, guided by the laryngoscope, in 1866 removed a needle from the base of the tongue of a woman. Weber discovered a fishbone in the middle of a scirrhouss tumour.

Anderson says that the amber mouth-piece of a pipe remained unsuspected for a month in a man's tongue. The man had jumped into the water to save another man from drowning, and thought that the injury to his tongue had been due to his striking his chin. It was only after the extraction of the mouth-piece that he remembered that he had been smoking a pipe at the time and had not taken

it out of his mouth before he dived into the water. Fork relates that a Prussian soldier had his teeth driven into his mouth by a bullet at the battle of Grossgörschen on May 2nd, 1813. On the thirty-second anniversary of the battle a swelling appeared on the tongue, from which the second lower molar, which had been embedded all that time, was extracted. Potter tells of an officer who, at the battle of Harper's Ferry, was struck by a Minié bullet, which knocked in his teeth, and very severe haemorrhage followed for a week. Then there was found under the tongue a wound, at the bottom of which lay a molar tooth. This was extracted, and the ranine artery tied. The officer recovered, and was killed leading his brigade at Gettysburg.

A foreign body may be suspected if a wound, especially a punctured wound, does not heal readily. The sinus should be examined with a probe, when the presumption may often be exchanged for a certainty. But the wound of entry may readily heal over a foreign body, which then forms an indolent swelling. In such a case it may resemble an encysted calculus, or a tumour. The history of an accident with the loss of a tooth, etc., may aid; otherwise, the diagnosis cannot be completed until the tumour is explored.

The extraction of a foreign body should never be undertaken except after due preparation for possible haemorrhage, the patient anaesthetised in a good light, the mouth well open, a thread passed through the tongue, and assistants at hand.

5. Acquired Ankyloglossia or Tongue-tie.

This is the result of extensive ulceration and sloughing, of which two causes are now less active than formerly—viz. mercurial glossitis and septic inflammation. It was the custom of administering mercury freely in the course of specific fevers that often led to this sloughing. A number of cases are mentioned following small-pox. Roland de Bélebat describes the almost complete loss of the projecting portion of the tongue in a young boy in the course of an attack of small-pox, recovery taking place, and the boy able to speak well. Boddington gave an account in the "Philosophical Transactions" of "Margaret Cutting, who speaks intelligibly although she has lost her tongue." But it is rather the adhesions which have formed between extensive

ulcerating surfaces which have caused the tongue to become fixed. South says of a case: "After severe sloughing, following the use of mercury, the side of the tongue was attached to the cheek for the extent of half an inch. A ligature was applied round the band, which cut through in three or four days, leaving the tongue free."

Ankyloglossia may be of syphilitic origin. Vausant described the case of a man who had suffered from severe secondary and tertiary syphilis. Recurrent attacks of ulceration of the fauces ended, after about ten years, in such union between the tongue, palate, and pharynx that the fauces were reduced to an opening one-eighth of an inch in diameter immediately dorsal to the tongue. Repeated and partial excisions of the cicatrix were followed by fresh stenosis. Finally, the whole cicatrix was excised by an extensive submaxillary operation, followed again by quick recurrence. The patient finally died exhausted.

Considerable fixation has followed the extravagant use of caustic solutions for diphtheria. In Routier's case of a man, nineteen, who had had diphtheria at eighteen months of age, and whose fauces had been freely cauterised with perchloride of mercury, the tongue, ten to fifteen millimetres from its tip, was intimately adherent by its dorsal surface to the palate, leaving only a small chink communicating with the pharynx. He could only take liquids, and phonation, especially as regards dentals, was impaired. The adhesions were divided by scissors and the galvano-cautery with very striking success.

Powell described the case of a Bengali boy, whose lower lip, from the right angle of the mouth nearly to the central incisor, was united by firm fibrous tissue to the right margin of the tongue over a broad surface. The corresponding teeth had all fallen out of the lower jaw. The deformity had been caused by ulcerative stomatitis three years before. Gunshot wounds have also caused extensive fixation of the tongue. Sédillot describes the case of a man who shot himself under the chin, lacerating extensively the tongue and lower jaw. In order to prevent the tongue falling back it was fixed forwards, where it became adherent to the wound in the neck. Sédillot freed the tongue and returned it to the mouth, afterwards closing the wound in the neck.

6. The Results of Removal of Part of the Tongue.

The splitting of the tongue, or the removal of the front part by seizing it and cutting it off with a knife, tearing it off with pincers, or burning it off with the cautery, was a cruel form of punishment directed against free speech. It continued in Europe until the last century, and in the East until the present one. It was largely employed in religious persecutions, and Fairlie Clarke describes the manner in which it was accomplished. There are also old pictures representing the sufferings of the martyrs. Much remark was excited by the fact that speech was completely recovered after these mutilations owing to the removal affecting only the anterior part of the tongue. The removal of a portion of the tongue by surgical operation is not followed by any marked impairment of speech so long as the projecting part of the tongue only is involved. It is a drawback to extensive operations on the base of the tongue and floor of the mouth that speech and swallowing of saliva and food are impaired.

7. Acquired Excessive Mobility (enabling the tongue to be projected into the nasopharynx).

A curious series of cases has been described, all practically identical, yet the widely distant position of the observers and the impossibility of one patient having heard of a previous case, force one to believe that the mobility has been acquired quite spontaneously with the object of obtaining relief from a chronic and tiresome affection. Jurist, Wherry, Bourdette, Winslow, and others were the observers. The patients have all been young adult men suffering from marked atrophic rhinitis and pharyngitis, who, after continuous efforts extending over some two months, have been able to curl back the tip of the tongue and project it into the nasopharynx. The tip of the tongue could thus lick the nasopharynx, and the patients felt much relief by the moistening of the surface and the removal of the sticky mucopus and crusts. With the tip of the tongue the patients could feel the posterior nares and the orifices of the Eustachian tube. No drawback was experienced from this increased mobility; the frænum was, of course, much stretched, and one or two patients said they had felt cracks in it whilst trying to curl the tongue back.

CHAPTER IV.

SEMEIOLOGY.—DISCOLORATIONS.

Production of Appearances—The Fur on the Tongue—The Stippled or Dotted Tongue—The Coated, Furred, or Plastered Tongue—The Dry Brown, Shrunken Tongue—The Bare Red Tongue: (a) the Raw Tongue; (b) the Dyspeptic Tongue; (c) the Hectic Tongue; (d) the Senile, Wasted Tongue—Xerostomia—Psoriasis or Sprue—Discolorations: (a) Xanthelasma; (b) Addison's Disease; (c) Black Pigmentation: (d) Blood-stains—Tinctorial Discolorations and Stains with Caustic—Varicosity of Ranine Vein and Artery in relation to Cerebral Congestion.

1. Production of Appearances on the Tongue.

In order to clear the way for a consideration of the local affections of the surface of the tongue, it is necessary to consider in this chapter the signs which the tongue exhibits in general disease, the formation of the fur on its surface and the raw surface left by the detachment of the fur, also the variations in the size of the tongue in relation to the circulation. The signs which the tongue exhibits in relation to nervous disease will be considered in a later chapter.

The results of everyday observations on the tongue are still extremely indefinite, although attempts have been made from the earliest times onward to collate the signs exhibited by the tongue with particular diseases as distinguished from constitutional states, and to make the tongue serve as an aid in the diagnosis of disease. Even in diseases such as scarlet fever or rheumatic fever the typical appearance may be entirely absent. The tongue is in no way a trustworthy mirror of alterations in the mucous membrane of the intestinal tract. Cancer of the stomach in the earlier stages causes no change in the tongue; the appearance of the tongue in a disease like typhoid fever varies from time to time, according to the constitutional state through which the patient is passing.

The formation of fur on the tongue and other changes are favoured by local conditions of which due note must be taken. The tongue is dried by breathing through the mouth, whether this be due to temporary or permanent nasal obstruction or to debility and unconsciousness. The formation of fur may be favoured by the loss of teeth, by the presence of a plate in the mouth, and a patch of fur may form opposite a gap from which one or two teeth have been lost. Furring is favoured by disease of the tongue, whether inflammation, ulceration, neuralgia, or paralysis, also because the patient does not take solid food to rub it off.

A diminution in the amount of saliva secreted favours the formation of fur—a diminution which takes place in the course of fever from whatever cause. The saliva does not appear itself directly to hinder the growth of organisms, but indirectly by favouring the formation of leucocytes in the tonsils and other glands, which cells hinder organismal growth. Diminution in the amount of saliva may not be the only thing which takes place in febrile affection, and there may be variations in the chemical composition of the saliva. (Hugenschmidt.)

The size and shape of the tongue is connected with the circulation. The size of the tongue varies with the blood pressure, as is most strikingly shown in cases of extreme thirst, in which the tongue shrinks as the pulse fails. Variations in the composition of the blood tending to anaemia produce the pale, flabby tongue; and if there is oedema, the tongue is easily indented by the teeth (*see Pl. I., Fig. 2*). In acute fever with high pulse tension, the tongue tends to become bright red, whilst it becomes bluer with cyanosis.

2. The Fur on the Tongue.

The fur on the dorsum of the tongue, whether in health or in disease, is composed partly of epithelial scales and of *débris* of the food, but especially of micro-organisms. A description of these micro-organisms was laid before the Royal Society, and was published in a separate paper in the "St. Bartholomew's Hospital Reports," 1879. (Butlin.) The subject has been since dealt with by Mr. Hutchinson in his

lectures at the College of Surgeons in 1883, and by Dr. Dickinson at the College of Physicians in 1888.* The examination of the fur scraped off the tongues of a large number of persons showed that in every case organisms were present, micrococci, also bacilli in threads or forming spores, spirochaeta, vibrios, and yeast organisms. The masses of micrococci appeared to form the bulk of the fur, and were attached very firmly to the imbricated scales of the filiform or hair-like papillæ. Sections of the tongue examined under a microscope showed that the micro-organisms were always attached to the filiform papillæ, and were seldom to be seen in the depressions between the papillæ or on the fungiform or circumvallate papillæ. When the fur is thin and the tongue is scraped firmly, the amount of epithelium removed is proportionately great. When the fur is thick, and can be easily removed without much force, the mass chiefly consists of micro-organisms. The quantity of food *débris*, of course, varies, but does not compose much of the fur.

A certain amount of fur, varying in individual cases, is not incompatible with the soundest health, especially on the dorsum in front of the circumvallate papillæ. The fur is limited to those portions of the tongue which are covered by the filiform papillæ. When the tongue is lightly coated, so that the fur does not form a continuous layer, it is plainly discernible that the fur adheres to the filiform papillæ and does not lie in the depressions between them. In such cases the fungiform papillæ are small, clean, and apparently sunken below the fur, but easily perceived. When the fur is so thick as to form a continuous layer, the fungiform papillæ are sometimes hidden, but this is by no means invariably the case; they can often be distinguished in breaks in the continuity of the coating. When the fungiform papillæ happen to be congested, as in scarlet fever, they stand out like the tiny berries of

* Dr. Dickinson, in his "Lumleian Lectures," considers the parasites which, to my mind, form the bulk of the fur, as "only of secondary interest." He regards the parasites as "the fringe of the garment rather than the garment itself." As I have always looked on the "fur" on the tongue as the fringe of the garment, and not as the garment itself, it is only reasonable that I should regard the parasites which make up the bulk of the fringe as the chief and most important constituent of the "fur" on the tongue. I, therefore, maintain, without any modification, the views which I put forward in 1879.—H. T. B.

a strawberry in the midst of a thick layer of white or whitish yellow fur. The circumvallate papillæ, like the fungiform papillæ, are very seldom covered with fur, and the dorsum behind the circumvallate papillæ has no fur on it, for it is destitute of papillæ. The tongues of very young infants, which are possessed of small and insignificant filiform papillæ, are naturally almost or quite without fur; the fungiform papillæ, which are earlier developed than the filiform, and are comparatively large and prominent, are smooth, so that the masses of organisms do not collect upon them. When the filiform papillæ have been removed by previous superficial glossitis, not a particle of fur may be visible, or merely tiny patches where the papillæ have not been quite destroyed and there is something to adhere to. In adults in health, fur forms during the night to a greater or less extent, according as the conditions are favourable to its development. In the morning almost every person has a very thin layer of fur over the papillary surface of the dorsum. During the day the greater part of this layer is cleaned off by the mastication of food, the movements of the tongue, the rubbing of the tongue against the roof of the mouth and teeth, and the actual washing of the mouth and teeth. The area most difficult to clear by these means is the area immediately in front of the circumvallate V, for this area cannot be pressed against the roof of the mouth and teeth and is less moved than any other part of the dorsum on which fur collects. This area, therefore, is scarcely ever free from fur, unless the filiform papillæ are deficient naturally, or have been removed or destroyed by disease. It is upon this area that the filiform papillæ sometimes grow to an inordinate length, whilst masses of micro-organisms cling to them and stain them a dark colour, producing the black, hairy tongue, to be afterwards described more particularly. From this area the fur extends during the night, or when the tongue is not kept thoroughly cleansed. Free mobility is essential to the thorough cleansing of the tongue. Stiff and unyielding tongues are scarcely ever clean.

The fur, then, is largely produced by the free growth of colonies of micro-organisms which have not been mechanically removed. Shed epithelial cells also compose a certain

amount of the fur, and this, with the apparent overgrowth of the filiform papillæ, has given rise to the supposition of an excessive production of epithelium. There is very little evidence of an excessive growth of epithelium and of the filiform papillæ as distinguished from an undue retention of epithelium as far as regards the production of fur. Local diseases of the tongue produce an excessive growth of epithelium, but this is distinct from the production of fur, and a comparison of the processes tends to negative the view that there is an excessive production of epithelium when the tongue is furred.

The appearance of the tongue in health varies very widely, some individuals having usually a considerable amount of fur; in others the tongue is quite destitute of fur, even having a raw look. On the other hand, a normal tongue may be met with in both acute and in exhausting diseases.

3. The Stippled, or Dotted Tongue.

This appearance is produced by a thin fur covering the filiform papillæ, whilst the normal or congested fungiform papillæ show through or project above the fur. They become brightly injected, along with the similar injection of the skin in scarlet fever, and they become bluish whenever there is an increased venosity of the blood. Whilst quite consistent with health, a stippled tongue is commonly seen in slight disturbances, with or without fever; it is common in children and in those taking liquid food.

4. The Coated, Furred, or Plastered Tongue.

This tongue is particularly seen in acute cases attended with fever. In the early stages the fungiform papillæ still appear through the fur, then the whole surface is covered by a yellowish-white fur, which gets browner and drier as the patient becomes more exhausted. If the patient improves the fur gets thinner and moister towards the edge, where the fungiform papillæ reappear, and as the tongue cleans, a streak of yellowish or brownish fur is at last left down the middle of the dorsum from the **V** forwards. Then the tip cleans, and finally the rest of the dorsum. The longer the fur remains without becoming dry the more shaggy it becomes from the accumulation of organisms on the filiform papillæ.

A thick fur often accompanies slight disorders of the

stomach and intestines, such as may be produced by free eating and drinking overnight, and popularly the lining membrane of these organs is supposed to be in the same condition as the tongue. There is no evidence that this is the case. The fur is the effect of the diminution of the amount of saliva secreted, perhaps also to alterations in its composition which, along with the malaise, are probably caused by abnormal substances in the blood derived from the alimentary canal.

The most thickly plastered tongue is seen in acute rheumatism, but no reliance can be placed upon this yellowish-white fur for diagnostic purposes.

Unilateral furring is generally the result of disuse and consequent arrest of cleaning by rubbing. This may be due to paralysis, to neuralgia, painful ulcer or sharp tooth, preventing movement which causes pain; also the discharge from a carious tooth is an additional stimulus to the growth of organisms.

5. The Dry, Brown and Shrunken Tongue.

This is the tongue characteristic of an exhausting illness, whether rapid or slow. The tongue may have passed through a stage of moist furring, but in certain conditions, e.g. septic peritonitis, the tongue in a day or so becomes dry and shrunken. Brown, dry crusts may cover the surface and hide the papillæ. Fissures tend to form, sometimes irregular cracks, sometimes deep transverse fissures, with longer and shallower longitudinal fissures, making the surface of the tongue resemble crocodile skin. Similar crusts or sordes cover the teeth and lips, they consist of inspissated mucus, in which are embedded masses of micro-organisms, yeast organisms, etc. What saliva there is in the mouth is sticky. The tongue is shrunken owing to the failing pulse tension, and continues to shrink to a hard, scarcely mobile mass, as the pulse tension further falls. The secretion of saliva is reduced to a minimum, whilst there is not enough muscular force to keep the jaw closed, or the patient is unconscious, so that the mouth dries by evaporation. This state of the tongue may be produced by extreme thirst, by acute diarrhoea and cholera. In typhus fever the tongue is described as becoming black. It is seen in the later stages of intestinal obstruction, typhoid fever, septic peritonitis, in

renal insufficiency, heart failure, the latter end of phthisis, and in cerebral affections, delirium, mania, etc. Such patients are said to be in an "asthenic" condition, and are like to die. If, however, the edges and tip of the tongue commence to become moist, and the crusts to separate, an improvement in the state of the patient is indicated, improved action of the kidneys, cessation of the delirium, etc., etc.

6. The Bare, Red Tongue.

The tongue appears not only free from fur, but the epidermis is extremely thin, owing to the early loss of the superficial corneous layers, including the filiform papillæ. In the more severe cases the tongue may, in addition to being bare and red, be dry, cracked and shrunken. Such a tongue has to be distinguished from slight cases of local disease, such as superficial macroglossia, tertiary syphilis (inherited or acquired), chronic glossitis from tobacco smoke.

(a) *The Raw Tongue*.—In some subjects the corneous layers are naturally extremely thin, and the tongue has been compared in appearance to a raw beefsteak. The patients have had the tongue with the same look as long as they could remember, and no inconvenience is caused except, perhaps, a slightly increased sensitiveness.

(b) *The Dyspeptic Tongue*.—A bare, red tongue is seen in some patients suffering from chronic dyspepsia, especially in women. It varies with the symptoms, and disappears when the dyspepsia is relieved. It is apparently due to reflex nervous irritation; but it is also possible for dyspepsia to originate a true chronic glossitis, as will be mentioned later.

(c) *The Hectic Tongue*.—The bare, red, often dry, shrunken, and cracked tongue is characteristic of long and exhausting illness, attended by prolonged suppuration, where there is chronic septic absorption or "hectic." Hence it is seen in chronic empyema, tropical liver abscess, chronic dysentery, advanced phthisis, diabetes. It may follow upon any condition which results in chronic pyæmia. If crusts form they separate, leaving a smooth, raw surface, covered by the deepest layers of epithelium only; the tongue loses much of its mobility, and becomes quite hard on palpation. If the chronic septic absorption is arrested the tongue begins to get moister at the edge.

(d) *The Senile Wasted Tongue*.—In old women and others who, although not old, have been exhausted, the filiform papillæ may as nearly as possible disappear, leaving a few of the fungiform papillæ and the circumvallate ones. The filiform papillæ appear to be shed like the hair. But such tongues may be seen drier than normal, slightly excoriated, tender, and then fall into the next category—xerostomia.

7. Xerostomia.

A series of clinical cases has been met with by Hadden and others in which, in consequence of a diminished secretion of saliva and mucus, there arises persistent dryness of the mouth and tongue. The trouble is apparently nervous in origin, and affects, in nearly all cases, women past middle life, half the cases occurring after fifty years of age. It occurred in men in four cases out of thirty-nine. The mouth and tongue are chiefly affected, but in one-fourth the nose, and, in a rather smaller number, the conjunctivæ likewise suffered from dryness. It is seen especially in neurotic women whose health has not been good, and it consists both in a diminished secretion and in a senile atrophy of the glands. It occurs at a later stage than atrophic rhinitis and pharyngitis, in which anaemia plays a great part, and in which the tongue and mouth remain free. Sometimes a vague illness, such as influenza, has been the commencement of the complaint; in others, mental shock or worry. The parotid glands have been found swollen and tender in some cases, not so the other salivary glands. The lips become dry and scaly, the tongue dry, smooth, dull red, the surface like crocodile skin, or fissured and cracked like eczematous hands, the filiform papillæ absent, the fungiform papillæ prominent. The gums, cheeks, and palate are dry and glazed, or may be covered with crusts. There is a salt taste in the mouth, but the taste for food is lost, although a strong solution of quinine may be recognised. The teeth are generally carious, or slowly crumble away. The secretions from the salivary papillæ may be very small or absent; some patches of buccal glands may show moisture. If the nose is involved, the interior is dry with crusts; if the eyes, only a yellowish, sticky fluid is found in the conjunctival sac, and the tears which can be made to flow are very scanty. The skin has

been noted to be very dry and harsh, and in other cases sweated rarely.

This is a permanent affection for which little can be done. Tonics and douches, with the removal of carious stumps and fitting in of suitable dentures, form the general line of treatment. Attempts to excite secretion by pilocarpine seem to be as useless as it is to flog an exhausted horse.

8. The Tongue in Psoriasis or Sprue.

Sprue is a chronic affection attacking men in the Straits Settlements, Batavia, parts of China and of India, including Ceylon. It is characterised by a persistent diarrhoea, consisting of pale yellow, frothy, unformed stools, with special soreness of the tongue and gullet. The tongue undergoes marked variations, returning to the normal, then relapsing. (Thin.) The corneous layers of the epidermis separate, leaving the tongue red and bare, and, as the patient becomes exhausted, it is more cracked and fissured. If the patient improves the sides become moist, and there is a quick return to the normal. But this has to be closely watched for any indication of relapse. The disease is not dangerous if the patient can return to Europe before getting exhausted, and is young and not otherwise diseased. The redness and rawness of the tongue, the soreness of the gullet, and the loose stools quickly disappear on a milk diet, and a return to the milk diet is required if a relapse threatens.

9. Discolorations of the Tongue.

Under this title will be considered discolorations of the fur, and areas of discolouration situated in the mucous and submucous tissues of the tongue, but the consideration of the white and bluish-white patches and plaques (*leucomata*) which characterise psoriasis, etc., also melanokeratosis, black tongue, or nigrities, will be reserved for another chapter.

(a) *Xanthelasma of the Tongue*.—Patches of xanthelasma have been only very rarely met with in the tongue. One of the best examples is that published in the "St. Bartholomew's Hospital Reports" by Dr. Wickham Legg. The patient was jaundiced, and, in addition to the jaundice, had xanthelasma of the eyelids and conjunctiva, of the palms of the hands, the left elbow, right ear and left side of the

nose. Along the sides of the tongue were yellowish-white oblong patches, quite soft, but slightly raised; there was also a yellow spot of the same kind on the middle line of the roof of the mouth, and another near the lingual vein. The patches on the tongue were sharply defined, and varied in size from a split pea to that of a sixpence. Two of those near the tip showed a slight loss of substance, and were covered with a crust of blood. The microscopical examination discovered, with a low power, narrow, long streaks of black immediately beneath the mucous membrane, and with a high power these black streaks resolved themselves into a great multiplication of the cells of the connective tissue, with fatty infiltration of most of them, appearances corresponding to those found in xanthelasma of the skin.

(b) *Black Marks in Addison's Disease.*—Persons suffering from Addison's disease not infrequently exhibit, in addition to the general discoloration of the skin, very dark or black marks on the mucous surface of the lips, the tongue, and other parts of the interior of the mouth. They look like mere stains of the mucous membrane, are sharply defined, neither raised nor depressed, and are usually situated on or near the tip and borders. They vary considerably in size.

Fowler gives a plate showing inky patches along a narrow strip on each side of the tongue, with patches on the palate, inner side of cheek, and forehead.

The presence of these dark patches in the interior of the mouth is not of much importance, clinically. They are always, apparently, associated with discoloration of the skin, and are, therefore, not likely to be very useful in the diagnosis of doubtful cases of Addison's disease. They produce no inconvenience, and in most instances the patient is not aware of their existence; they, therefore, require no treatment.

(c) *Pigmentation in Exhausting Diseases.*—Dr. Greenhow has described a case in which there were patches of bluish-black discolouration at the tip and on each side of the tongue, with brown patches on the inside of the lips and cheeks. These patches were precisely similar in every respect to those which

occur in Addison's disease. But there was no discolouration of any part of the surface of the body, and the marks had been noticed on the tongue three years at least. The man died of advanced pulmonary phthisis, and after death the supra-renal bodies were found to be quite healthy. Arnott made a microscopical examination of portions of the discoloured mucous membrane, and discovered that the pigment was present only in the corpuscles of the connective tissue of the papillæ and of the submucous layer; whereas in Addison's disease the pigment occurs in the deeper cells of the epidermis, and little or not at all in the connective tissue.

Danlos saw a case with a number of blackish patches on the buccal mucous membrane and on the left side of the tongue in a man who had not Addison's disease, but heart and kidney disease, with emphysema and bronchitis. He was in a miserable state, covered with pigmented patches, melanodermia, the result of phthiriasis.

(d) *Blood-stains* are occasionally observed in purpura. Froriep has figured the tongue of a person suffering from purpura haemorrhagica, and on the dorsum are two large blood patches, very black in colour. The illustration does not afford much idea of the actual condition of the tongue, for it was done many years ago, and is very deficient in artistic power and colouring.

Echymoses may occur in and beneath the mucous membrane from other causes than purpura. As they disappear, they may leave behind brown and yellow stains, which are very slow in passing away. It is not improbable that the dark marks in the case described by Greenhow owed their origin to this cause.

Blood-stains are, of course, easily distinguished; whether they are the only disease present, or whether they are only a symptom of a general disease, they require no special treatment.

The foregoing conditions are easily recognised, and can scarcely be assumed. The colour lies in the very structure of the tongue, and cannot be removed or greatly altered unless by destroying some of the superficial structures of the organ. Even the colours produced by caustics are much

more superficial than these, and if they are deeper placed, can be so only by previous destruction of the superficial layers of the mucous membrane.

10. **Tinctorial Discolorations and Stains with Caustics.**

It may be useful here to set down in a tabular form the discolorations and stains which can be produced by tinctures and the application of caustics. Most of the following table is copied from Rigal's table in the "Dictionnaire de Médecine et de Chirurgie Pratique":

Black.—Ink, red wine, mulberries, certain varieties of cherries, steel wine, and other preparations of iron.

Brown.—Tobacco, liquorice, fresh nuts, prunes.

Brown-red.—Chocolate.

Yellow.—Saffron, laudanum, rhubarb.

Red.—Red quinquina, rhatany, raspberries, cherries.

The effects of caustics are :

Grey-white.—Sulphuric acid, oxalic acid, carbolic acid.

Yellow.—Nitric acid if the effect is superficial, chromic acid.

Red.—Acid nitrate of mercury.

Grey and gelatiniform.—Caustic potash.

White or pearl-grey.—Nitrate of silver, corrosive sublimate (white and shrivelled).

The effect of some of these re-agents, of tobacco, steel, ink, liquorice, nitrate of silver, rhubarb, and fruit, is notorious. The effect of some of the others we have tested, and have generally found that Rigal's statements respecting them are correct. One or two of those relating to the caustics have been altered and amended.

Some of these discolorations may give trouble in diagnosis until the source can be traced. The mystery concerning a blue tongue, under Dickinson, was cleared up by finding that the patient had been accustomed to nibble an anilin blue pencil, fragments remaining for a long time between the teeth.

Peculiar brown patches on a tongue were caused by deposition of nitrate of silver, which the patient had freely applied to his tongue. (Shimmer.)

11. **Varicosity of the Ranine Veins.**

It is a very ancient belief that a dilatation of the ranine

PLATE II.

Fig. 1.—Fissured tongue from a man, 34 years old, the subject of tertiary syphilis.

Fig. 2.—Great disfigurement of the tongue, produced by tertiary syphilis, in a woman.

Fig. 3.—Chronic ulcer of the tongue in a man, surrounded by contracted tissues.



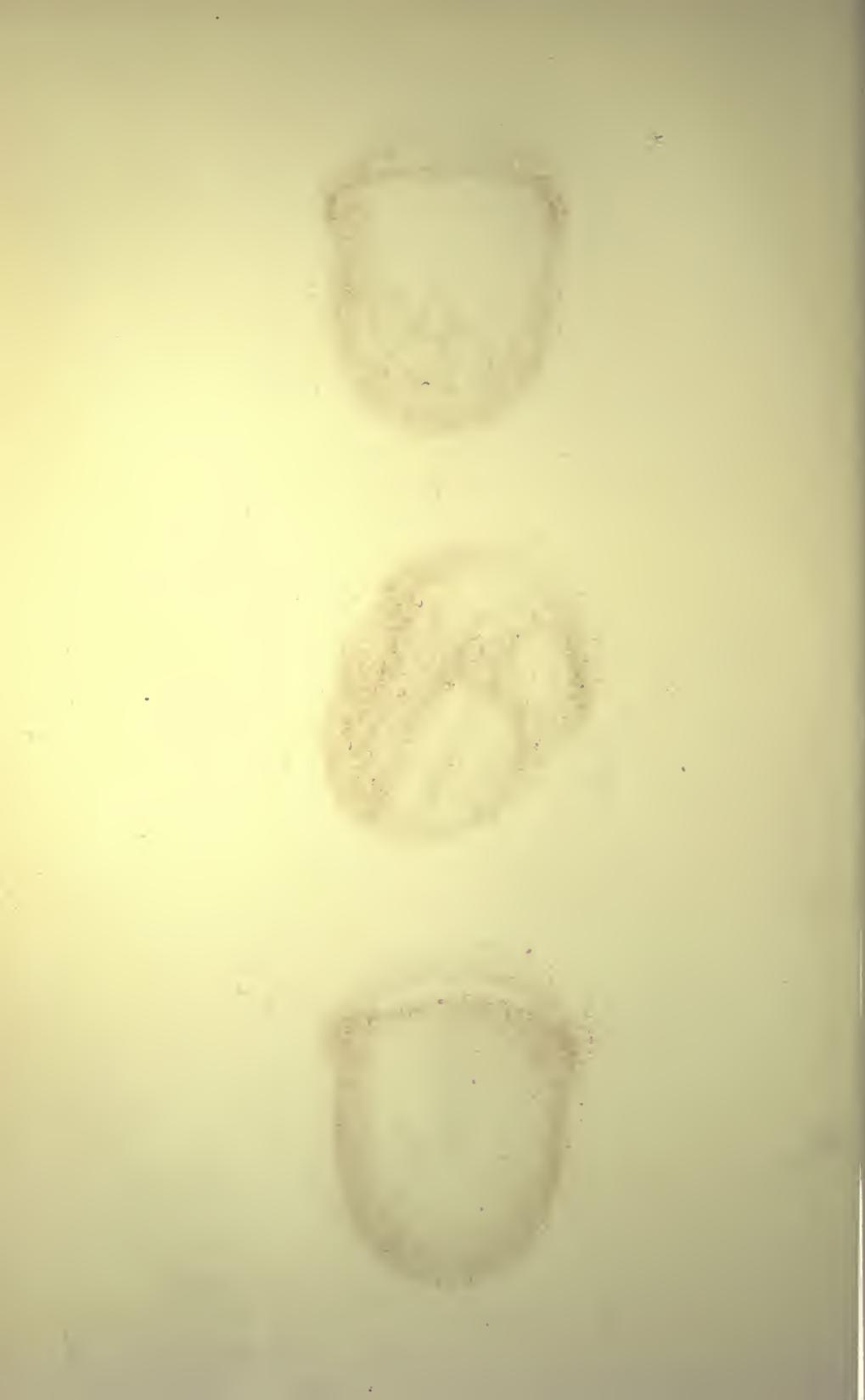
Fig. 1



Fig. 2.



Fig. 3



veins serves as an indicator of cerebral congestion. It is one of the veins upon which venesection used to be done. This question of relationship has been discussed by Dickson, Whitehouse, Atkinson, and Greenwood.

Gillot also considers that dilatation and tortuosity of the ranine artery and vein under the tongue point to a similar state of the cerebral arteries, and hence are premonitory of apoplexy.

CHAPTER V.

ACUTE PARENCHYMATOUS GLOSSITIS—ACUTE ABSCESS —GANGRENE.

Clinical Description of Acute Parenchymatous Glossitis — Pathology, Micro-organisms in the Mouth—Streptococcal Glossitis, Ludwig's Angina—Staphylococcal Glossitis and Acute Abscess—Acute Haemorrhagic Glossitis—Mercurial Glossitis—Gangrene of the Tongue : (a) Acute Sloughing Phagedena ; (b) Noma ; (c) Anthrax of the Tongue, Glossanthrax.

1. Clinical Description of Acute Glossitis.

Acute inflammation of the tongue is admitted by all observers to be a rare disease. Even the largest hospitals in this country do not, in most years, record a single instance. Yet the history of the disease may be written with tolerable accuracy, for the very rarity of acute glossitis has led to the publication of a goodly number of cases in medical literature.

From a study of these cases we learn that acute glossitis is much more common in adults than in children, and is more common in young adults than in old ; also that it attacks men more frequently than women, and that it is more frequently observed in the winter than in the summer.

The onset of the inflammation is almost always very rapid. A little tenderness is experienced in masticating solid food, the movements of the tongue are attended with stiffness or with pain, or there are pains in the muscles of the neck and submaxillary region. Before these symptoms have existed many hours the tongue begins to swell ; the swelling rapidly increases, until, in the course of twelve to twenty hours, the tongue is two or three times its natural size, protrudes from the mouth, is indented by the teeth, and is almost immovably fixed. It feels heavy, is usually very painful and tender, and every attempt at movement

is extremely painful. The dorsum of the organ is for the most part covered by a thick, opaque, white fur, and beneath the fur is livid, smooth, and glazed, or, if long protruded, is dry and cracked, and brown. A profuse salivation accompanies these symptoms ; speech is impossible ; dysphagia is invariably present, and dyspnoea is not unusual. The submaxillary salivary and lymphatic glands are often greatly swollen. It must not be imagined that every case presents symptoms of the same severity ; in some there is much more swelling of the tongue than in others ; in some the swelling is greater towards the back of the mouth ; in others, again, the inflammation is accompanied by very severe pain. In all cases there is fever, but the temperature seldom rises above 101° , however severe the case may be.

It will readily be understood, from the symptoms, that acute glossitis is not devoid of danger to life. In spite of all remedial measures, death may occur in the course of a few hours, either from diffuse suppuration in the substance of the organ, from exhaustion, or from septic fever and pneumonia. The tongue, too, may mortify, and, from the causes connected with this event, death may take place at a later period. Happily, these events are rare. Even suppuration is not common, and when it does occur, is in most instances limited in extent. The tendency of the inflammation is towards spontaneous resolution. The swelling begins to subside in the course of three, four, or five days ; small superficial sloughs form upon the surface, and, separating, leave superficial ulcers ; and at the end of a week the tongue has almost regained its natural aspect. With the subsidence of the inflammation disappear the fever and the symptoms which distressed the patient : the voice returns, first in a whisper, then louder ; the dyspnoea is quickly lost ; and the dysphagia, although it abides longer than the other symptoms, finally gives way. According to the loss of substance from sloughing, so will be the permanent disfigurement, but this is seldom sufficiently grave to attract notice ; adhesions are very rarely formed, and the movements of the tongue are not impaired. In a few instances the swelling has partially subsided, the fever and most distressing symptoms have disappeared, but the tongue has remained thickened, either in whole or part,

sometimes for many days or weeks, sometimes permanently. One such case is described in which the swelling and some troublesome symptoms were apparently kept up by the pressure and rubbing of the teeth against the tongue, for when means were taken to prevent this the disease speedily disappeared.

The general predisposing causes of acute glossitis are especially cold and damp, excessive doses of mercury, and exhaustion arising in the course of the specific fevers. Of the predisposing causes of glossitis, that is, of the glossitis which has been now described, probably none exercises so great an influence as cold : not simply cold weather, but the catching of cold, tending to depress the natural resistance of the body. The cause to which the patients themselves most frequently attribute the disease is the catching of a cold ; it occurs much more frequently in the winter months, when colds are most common and severe ; it commences in many cases with muscular pains and general symptoms of malaise ; it runs the rapid course of acute inflammatory attacks, and tends to terminate in resolution. Some authors (Weber, for example) speak of the occurrence of epidemic glossitis in the wet and cold seasons of the year. The statement is rather deficient of support, but if it be true, such epidemics would lend additional colour to the predisposing tendency of catarrhal inflammation ; it is notorious that epidemics of catarrhal inflammation of parts which are in average years rarely attacked occasionally occur, and it is only reasonable to suppose that the tongue is liable to the same laws as those to which the neighbouring parts are subject in relation to catarrhal inflammations. It is quite in harmony with this theory that acute glossitis should occasionally attack persons who have been drinking beer and spirits heavily, and smoking immoderately at the same time. These are exciting causes which determine the inflammation of the tongue in preference to other, and perhaps neighbouring, parts. And it is not surprising that the disease attacks, by preference, persons who are not in good health at the time of its occurrence. The chief difficulty in connection with this, or, indeed, with any theory, is to explain why the tongue is so rarely the

seat of acute inflammation of its substance. Its situation, so much more exposed than the tonsils, the frequency with which it is injured by the teeth and by the foods introduced into the mouth, would mark it as a part which might reasonably be expected to be frequently attacked by severe inflammations. In some instances the inflammation appears to be the result of direct exposure to cold air with the mouth widely opened, but in by far the larger number of instances the exposure has been indirect and general. Among the chief local predisposing causes are injuries to the tongue, especially bites from carious teeth.

The *diagnosis* of acute parenchymatous glossitis is generally so easy that it seems almost unnecessary to speak of it. The fever, the rapid and excessive swelling of the tongue, the salivation, and other symptoms, are so peculiar to this disease that it can scarcely be mistaken for any other. In a few instances, however, a difficulty has been experienced in deciding between glossitis and acute œdematosus swellings due to salivary calculus and other affections of the floor of the mouth. S. Mackenzie has described a case of "acute ranula," which produced considerable swelling of the tongue, and led to the belief that the patient was suffering from acute glossitis. The case is very interesting, although the evidence that the affection was acute ranula is not very clear. The practical lesson to be learned from these and similar cases is that the floor of the mouth should be carefully examined in every case of supposed glossitis.

It is probable that the large majority of patients with acute glossitis would recover without more active *treatment* than a dose of purgative medicine and diet of slops. Not a few of the recorded cases have been treated thus, with the result of a speedy recovery. But the symptoms are so distressing, and sometimes apparently so urgent, that practitioners are not inclined to adopt the expectant course. The less serious cases are treated by leeching the submaxillary regions, and employing astringent lotions or iodine to the tongue. Other cases are treated by the application of blisters to the floor of the mouth, and of ice to the tongue. But the more serious cases, those which are aggravated by dyspnoea and extreme dysphagia, require more

active measures. I (Butlin) remember, shortly after I entered at St. Bartholomew's Hospital, making the round of Mr. Wormald's wards, and seeing there a man suffering from acute glossitis. His tongue was greatly swollen, and protruded from his mouth, and he was salivating profusely. Mr. Wormald accosted him in the following manner : "Well, you've been guzzling and swilling, and making a beast of yourself," a statement which in this particular instance was strictly true, but if it had not been, the man could not have defended himself, for he could not speak. Mr. Wormald then took a knife from his house surgeon, and, to my horror, cut deeply into the substance of the tongue on each side of the middle line for a length of at least two inches. The operation appeared to me at the time most brutal, but on the following day I found that the man's symptoms were marvellously relieved. He could retain his tongue within his mouth, could speak and swallow, and the salivation had completely ceased. Severe as this course may seem, it is, we believe, the best to pursue in most cases of acute glossitis. The symptoms are not always so rapidly relieved as in the case which has just been related, but relief is speedy, and almost invariably sure, and at the expense of a sharp momentary pain the patient is spared many hours, or, it may be, days of torture. Deep suppuration, too, is much less likely to occur after incisions have been made. Two longitudinal incisions, one on either side of the middle line, and about two-thirds of an inch from the raphé, are to be preferred. They should penetrate to a depth of one-third of an inch, and may best be made with a very sharp curved bistoury. The haemorrhage is never serious unless the incisions have been carried too deeply, and the moderate bleeding which occurs is decidedly beneficial. The chronic thickenings which remain behind after certain cases of acute glossitis are not very amenable to treatment. The condition of considerable thickening, associated with salivation and other distressing symptoms, which was alluded to on a previous page, was combated by means of a gutta-percha splint or mould applied over the lower teeth, which prevented the tongue from being rubbed and pressed ; the result was rapid improvement.

2. The Pathology of Acute Glossitis.

Micro-organisms commonly found in the Mouth and on the Tongue.—Organisms of various kinds are found in the healthy mouth. Not only a number of saprophytic organisms, but well-recognised pathogenetic organisms which for the time being are living as saprophytes—organisms undoubtedly pathogenetic, such as staphylococci, streptococci, pneumococci and diphtheria bacilli. In order to explain their general inactivity it may be said that they are inert, comparatively non-pathogenetic varieties, hence the term "pseudo-diphtheritic" bacilli. But it has been shown that the so-called pseudo-diphtheritic bacilli can be cultivated so as to become fully virulent, therefore it appears most probable that these well-known pathogenetic organisms only await a suitable soil upon which to develop. There are other saprophytic organisms which are doubtfully pathogenetic, but which undoubtedly flourish in unhealthy mouths, and perhaps by increasing infective discharges aggravate the disease. Such are yeast organisms, as saccharomyces growing on aphthous ulcers, leptostrix in connection with carious teeth, spirilla and spirochaeta, and bacillus maximus buccalis. The protection of the mouth and tongue against the growth of such organisms is recognised to be connected with the secretion of the saliva. According to Hugenschmidt the idea that the saliva itself has bactericidal properties is erroneous. Sulphocyanide of potassium, supposing it to exist in saliva, has no such action. The saliva is nevertheless the important agent, owing to its chimiotactic properties. It causes diapedesis of white cells, whether from the surface of an ulcer or from lymphatic gland tissue at the base of the tongue and tonsils, which rapidly englobe and destroy organisms. Special attention has been paid to leptostrix owing to its being found in connection with carious teeth, and in the follicular inflammation attacking the lymph follicles at the base of the tongue and tonsil. But the specific pathogenetic properties of leptostrix have not been demonstrated. Mycosis tonsillaris benigna was described by Fränkel in 1873. Hening called it pharyngomycosis leptostricæ. It is a kerotosis with threads of leptostrix buccalis, and also the bacillus maximus buccalis. A number of bacteriological observations

have been made in cases of acute glossitis, from which it is found that one kind of organism is particularly in excess in each case, and thus produces peculiar features, so that the attack of acute glossitis can be recognised clinically to be due especially to that kind of organism. Doubtless in all cases other organisms are present—a pure cultivation of one kind is not to be expected—but they play a subordinate rôle. Hence the various cases may be distinguished by the organisms which have chiefly produced them.

3. Streptococcal Glossitis.

This form is marked clinically by the large amount of local œdema, and by the danger of extension to the neck, to the glottis, to the lungs, and to the pericardium. Its extension to the neck has the name of Ludwig's Angina, so called after Ludwig, of Stuttgart, who, in 1836, described the affection. It commonly starts by an acute œdematous swelling between the geniohyoglossi and the mylohyoid, and about the sublingual gland and Wharton's duct. An acute, œdematous, brawny swelling forms in the neck, which, if the patient survives, tends to break down into multilocular abscesses. But life is rapidly threatened by œdema of the glottis, by septic pneumonia, and by heart failure. The mortality is very high; it has been as much as one-half. Streptococci are chiefly found, but also staphylococci. The relationship of the disease is shown by a case described by Garel of a man, aged thirty-seven, who had a small ulcer, due to a tooth, from which the tongue rapidly swelled. The swelling spread to the nasopharynx, nose, and finally to the face, where it appeared as a typical attack of facial erysipelas. Streptococci were found in the blood and fluids. Sabrazès and Bousquet record the case of an exhausted woman who had a miscarriage, followed by puerperal fever, of which she died in ten days. Three days before death the tongue became enormously swollen. Post-mortem: streptococci were found in all parts of the tongue, also in connection with the broncho-pneumonia, pleural effusions, the tricuspid endocarditis, and the large white kidney. The following cases exhibit the effect of exposure to cold and damp, with possibly foul odours. A man of thirty, in active work, had had rheumatic pericarditis; he went for a walk along the Thames near London one winter

afternoon, and on his return complained of sharp pain in the throat. The tongue became swollen, then the throat, then the neck. On the second day he was in difficulty from œdema glottidis. It was necessary to cut through thick œdematosus tissue in order to insert a tracheotomy tube. This relieved the respiration, but an hour afterwards he died of heart failure. In two cases described by Syme, both men working in the damp, opening foul drains, one man aged fifty, the other thirty, there was very acute œdematosus glossitis, which was relieved by incisions.

The finding of streptococci in this acute œdematosus form of glossitis has suggested the administration of streptococcal antitoxin. But it would be unwise or harmful to administer the antitoxin haphazard, as has so often been done, until the streptococci have been demonstrated. In a young man under Spencer with acute swelling of the tongue, fauces, and neck, also with pericardial pain and a loud friction rub, streptococci were found in scrapings from the throat and in the swollen glands in the neck. The patient, who seemed dying, rallied at once on the administration of the antitoxin, and got quite well.

4. Staphylococcal Glossitis and Acute Abscess.

The characteristic feature of this form of glossitis is an acute localised swelling, which increases without any marked extension around. A hard, resistent swelling forms, which may yield fluctuation and burst into the mouth. It is probably only when there is a mixed infection with streptococci that there is extension to the neck, with the formation of deep multilocular abscesses. Such a swelling is likely to form as the result of an injury, a bite, sting, or injury from a pipe-stem, or other object held in the mouth. It may be caused by a kick or blow under the chin. It is acutely painful, but the patient can swallow, and may show some difficulty in breathing, but the condition is not dangerous to life. The acute swelling attracts attention, and on puncturing or incising there is an escape of pus or broken-down tissue containing staphylococci. A puncture or small incision should be made very early under cocain. Even if pus does not escape, tension will be relieved and further suppuration limited. The swelling may be on the dorsum of the tongue,

and show evident fluctuation, as in Colby's case, which extended from the foramen cæcum nearly to the tip. If below the tongue, which is raised and pushed back, care must be taken to thrust in blunt forceps, and not to use the knife freely lest the blood-vessels be injured. If the abscess is a large one it may be proper to make a counter-opening, in the middle line below the chin, and to pass a drainage tube through from the mouth, by which means irrigation may be carried on for a few days. If seen later, the abscess may itself have ruptured into the floor of the mouth, or even into the pharynx. An abscess burst into the larynx, and caused fatal asphyxia, whilst the patient was being anaesthetised by nitrous oxide gas preliminary to incising the abscess.

5. Acute Hæmorrhagic Glossitis.

Mygiud describes a rare condition, which complicated acute glossitis, in one of his patients. The man was aged forty-seven, had suffered from chronic rheumatism, had had several slight attacks of delirium tremens, and also suffered from severe frontal headache, epistaxis, and haematemesis. The illness began with fever and rigors, then occurred swelling of the tongue, with free haemorrhage from the mouth. There was a dark haemorrhagic suffusion on each side of the tongue extending to the frænum, involving both the upper and under surface, but not so marked on the dorsum. The fur which was scraped off the dark surface was uncoloured; the saliva, which could not be swallowed on account of the swollen tongue, was slightly blood-stained. He also vomited dark blood, which had been swallowed. The patient became delirious, but afterwards recovered. The treatment consisted in the application of ice and the administration of ergot.

6. Mercurial Glossitis.

Formerly by no means an uncommon kind of glossitis, it is now very rare, owing to the care which is exercised in the administration of mercury, and to the greater caution than formerly of the various workers in mercury. In the worst forms of mercurial glossitis the tongue swells, sometimes considerably, but not to the same extent as in acute general glossitis; it is pressed against the teeth so as to

be marked by them; its surface is thickly coated. It is exceedingly tender, prone to superficial sloughing, or, more frequently, to excoriation; it is not so firm as in the preceding forms of glossitis, the enlargement being rather oedematous. The breath is horribly fetid. These signs would alone suffice to throw suspicion on the nature of the affection, but with them are associated other and such clear proofs of the mercurial origin of the disease that the diagnosis is singularly easy. The gums are swollen, tender, and spongy, and are apt to bleed; the teeth are loosened; the inside of the lips and cheeks is swollen; salivation is even more profuse than in the most aggravated forms of acute general glossitis. The febrile symptoms are not usually so pronounced as in the other varieties of glossitis, but fever is generally present.

The symptoms usually subside shortly after the mercurial course or employment has been discontinued; but the cure may be expedited by the use of chlorate of potash, ten or fifteen grains to the ounce of water, administered every four or five hours, by chlorate of potash gargles of the same strength, and a little later by astringent gargles of alum or perchloride of iron (ten minims of the tincture to the ounce of water). Tonics are of use in most cases of mercurial glossitis, for patients who are poisoned with mercury (as it is now employed) must be singularly susceptible to its effects or much out of health. A purge of two drachms of Glauber's salt or a seidlitz powder should be given, in order to get rid as speedily as possible of any mercury which may still remain in the intestinal canal. In very severe cases, where the tongue is excessively swollen and the patient is suffering greatly, leeches may be applied below the jaw, and ice should be constantly kept in the mouth. Such cases are now, however, rare, and death from mercurial glossitis, as Stromeier saw it occur, is, we may hope, a thing of the past.

It must be remembered that mercurial glossitis may be excited in susceptible persons by a drug which contains mercury, although the mercury may not have been administered for a specific purpose, such as the cure of syphilis. Thus, calomel, or blue pill, when freely given,

may excite glossitis. A healthy girl had a nævus on the side of the tongue upon which it was proposed to operate, but in order to prepare her, as it was supposed, for the operation, a course of blue pill for three weeks was prescribed. At the end of a week the girl was very ill with acute glossitis, followed by sloughing. When she got better it was found that the nævus had sloughed out, leaving an ulcer, which quickly healed. (Brown.)

Mercurial ulcers are dealt with in Chapter IX.

7. Gangrene of the Tongue.

(a) *Acute Sloughing Phagedena*.—An acute local glossitis may end in gangrene and sloughing, leaving a stump of tongue, or all the projecting part of the tongue may disappear.

The case described by Roland de Bélebat has already been quoted. It happened to a boy, aged four or five, in the course of smallpox. Banon described a similar case. An old man, aged sixty, whose deglutition was normal and his speech good, except for certain words, had suffered when a child, and his tongue had melted away, leaving the floor of the mouth a perfectly smooth surface without any nodule. The disease had been attributed to sucking copper coins. Perhaps the copper acted in a similar way to mercury. The loss of the tongue was confirmed by a post-mortem examination. Pritchard described a remarkable case of sloughing of the tongue. A man, aged fifty, had noted ten months before a pimple, which was attributed to smoking. Then an inflamed ulcer formed, which was daily touched with nitrate of silver. Under this the tongue became hard, immobile, not swollen. Then the tip became black, and the gangrene spread until the whole was a mass of moist gangrene upon which chlorate of potash and other disinfectants were useless. The patient, who could not swallow, was supported by enemata. In three weeks the slough had separated, and a fortnight later speech could be understood, after which he rapidly recovered.

In some cases the gangrene is connected with syphilis. In Mendel's case the anterior part of the tongue formed a greenish slough, which, under treatment by iodides separated, leaving a healthy granulating surface. Eustace describes a

case in which the anterior part of the tongue was destroyed as far back as the frænum by a process which he compares to the sloughing phagedena of the penis. It occurred in an Indian, aged twenty, who had led an irregular life. When first seen, the tip of his tongue was occupied by an ulcer the size of a shilling, covered by an adherent grey slough. Extension took place without elevation of temperature or enlargement of glands. It was treated by applying pure carbolic acid, and the slough separated at the end of a week.

Von Gietl mentions a man suffering from syphilis, also gonorrhœa and urethral stricture, complicated by uræmia, with facial paralysis; this was followed by gangrene of the tongue. The slough afterwards separated and the tongue healed.

A sepoy, under Moriarty, suffered from malarial cachexia, followed by ulcerative stomatitis and gangrene, which involved the anterior left half of the tongue. The slough was expectorated in fourteen days and healing followed.

(b) Noma only affects the tongue by extension from the cheek. Although not likely, the process may be arrested and healing occur. A case has already been quoted in a former chapter, under "Acquired Ankylostomia."

Lingard met with an epidemic gangrenous process in the tongues of calves and found a short bacillus, such as is found in cases of ulcerative stomatitis or noma in children. Schmidt confirms Lingard's view of the pathogenetic nature of the bacillus, although staphylococci and streptococci are present in abundance; but others think that these latter organisms are sufficient to account for the process.

(c) *Anthrax of the Tongue; Glossanthrax*.—This is a very rare affection, invariably the result of direct inoculation. The first supposed case was published by Heyfelder, in 1834, of a Prussian butcher, who, while slaughtering a diseased sheep, put the knife between his teeth and held it there for some time. In two or three days the margin of his tongue was covered with black pustules, while the entire tongue was hugely swollen, and in less than three days from that time he died. Here microscopical evidence of the presence of the anthrax bacillus is, of course, wanting. Mikulicz and Kümmel mention that two men

were affected by anthrax who had used a silver spoon which had previously served to scrape an animal's tongue affected with anthrax. Rammstedt furnishes the proofs of a case. A man, aged twenty-eight, had swollen, bluish lips ; the mouth could only be partly opened ; the tongue, tonsils, and palate were swollen. On the under surface of the tongue, one centimetre from the tip, was a black patch the size of a shilling, which was forming a slough. The face and glands in the neck were swollen. There was a blood-stained discharge from the mouth, and anthrax bacilli were found in the slough and in the blood of the tongue. There was no anthrax pneumonia nor bacilli in the expectoration, and no intestinal anthrax.

The Treatment of Gangrene of the Tongue.—The mouth is cleaned by frequent rinsing with water containing a weak antiseptic, such as permanganate of potash, and by cleaning the teeth with a chalk powder or soap containing carbolic acid. A more energetic disinfection can be carried out by painting the infected spots with perchloride (alternatively, the iodide or bicyanide) of mercury, 1 in 1,000, taking care not to let any of the fluid escape down the throat ; or pure carbolic acid can be gently rubbed in, and afterwards washed away. A valuable means of cleaning a foul surface is by applying powdered chlorate of potash ; it is painful at first, but rapidly cleanses. Its use, however, is limited to adults ; it should not be applied in children, who might swallow it. Iodoform powder is also dusted on foul, gangrenous sores. It should be used with moderation in the crystalline form.

CHAPTER VI.

ACUTE SUPERFICIAL GLOSSITIS.

Hemiglossitis : (a) Parenchymatous ; (b) Nervous or Herpetic—Membranous Glossitis and True Diphtheria—Thrush or Aphthæ—Aphthæ Epizooticæ, the Foot-and-Mouth Disease of Animals.

THE subjects with which this chapter is concerned differ from those of the previous one in that the inflammation involves, in the first place, the superficial epithelial surface of the tongue. There is no very sharp line of distinction, and some of the substance of the tongue may be involved near the surface, and so some general swelling of the tongue be caused. Moreover, some of the causes of acute superficial inflammation may also cause subacute and chronic inflammation. It will be more convenient as regards the superficial follicular inflammation and abscess at the base of the tongue to postpone that subject, and consider all the affections of the lingual tonsil in one chapter.

1. *Hemiglossitis.*

As described by some, this is an acute parenchymatous inflammation of a superficial and benign type; according to others, it is a superficial inflammation of nervous origin. Duckworth regarded the affection as a catarrhal neurosis, and this seems to apply especially to the second or herpetic form.

(a) *Parenchymatous hemiglossitis* is rarer than acute glossitis, the number of recorded cases in which the inflammation has been limited to one-half of the tongue being small. They bear, however, a striking resemblance to one another, so much so that the account of one of them would almost suffice for each of the others. In most cases the left half of the tongue was affected, either solely or chiefly; for when, in some of them, the swelling extended to the right half the left remained much more swollen than the right. In

the left half there was, too, in almost every instance, a lump or nodule, either placed deeply in the substance of the organ, or a little raised upon the dorsum, thick, elastic, firm, and more tender than the surrounding parts. The onset of the inflammation was, in most of the patients, marked by general malaise or fever, by rigors, and by pains in the side of the head and face. Then the half of the tongue began to swell, and the swelling quickly increased, extending in some cases to the other half, remaining in other cases strictly limited to the half in which it had commenced, but reaching quite up to the middle line. The swelling appeared to affect chiefly, if not entirely, the anterior two-thirds of the tongue, which led De Mussy more particularly to ascribe the disease to an affection of the lingual branch of the fifth nerve. The dyspnea noticed in some of the cases of acute glossitis does not appear to have been present in any of these; indeed, none of them presented very alarming symptoms, and in no case were incisions necessary to procure resolution. The swelling subsided in from three to five or six days, although not always completely, for in Graves's patient the left half of the tongue was still enlarged at the end of two years. With the exception of slight erosions, the disease does not seem to have been complicated by sloughing, ulceration, or suppuration.

If we compare the account of this disease with that of acute glossitis, we shall find that hemiglossitis is, on the whole, a milder affection than general glossitis, but that otherwise it differs only from general glossitis in the occurrence of a definite nodule, or lump, in the substance of the inflamed part. Both affections are much more common in men than women; both are usually ushered in by febrile symptoms; both are often preceded by pains in the submaxillary region and muscles of the head and neck; both run a rapid course, and tend to spontaneous resolution; both diseases may leave behind an enlargement of the affected part, which may be permanent or very long-enduring. For the differences between them, they are not very difficult to explain. The less severity of hemiglossitis may be due to the fact that the one half of the tongue is either not at all or only slightly swollen, and that the swelling is chiefly

of the fore part of the tongue; deglutition is therefore not so difficult or so painful, and there is no cause for dyspnœa. For the same reason the incisions often practised in acute glossitis are not required in hemiglossitis. The lump, or nodule, felt in hemiglossitis may be present in many of the cases of acute glossitis, but the excessive swelling of the entire tongue prevents it being felt. It is worthy of note that in one of the patients seen by Sir Dyce Duckworth the inflammation followed a bout of drinking beer and spirits.

The *treatment* of hemiglossitis is very simple. Leeching and scarification are scarcely ever necessary. A purge, followed by a drink of chlorate of potash, and a liberal diet of beef-tea, eggs, and milk, with the local application of ice, or, where warmth is more acceptable, of warm gargles, or bathings of the tongue with solutions of borax or chlorate of potash, are all that is required. As the inflammation subsides the emollient lotions may advantageously be changed for astringents: alum or chloride of zinc, ten grains to the ounce of the former, two grains to the ounce of the latter.

(b) *Nervous or Herpetic Hemiglossitis*.—In some of the cases, especially those described by Gueterbock, the affection had clearly a nervous origin, and the inflammation of the tongue was closely allied to herpes of the skin. In the first of Gueterbock's cases, a waitress, aged eighteen, had had a herpetic eruption on the face for fourteen days, with blisters on the tongue for five days. The herpetic vesicles on the tongue, which no longer contained fluid, were strictly limited to the right half of the tongue, extending to the tip, but not to the floor of the mouth. In the second patient, a lawyer, pain began in the ear, with facial paralysis, and on the third day there was a herpetic eruption all over the right half of the tongue. The eruption quickly disappeared, but recovery from the facial paralysis was protracted. In Mackenzie's case there was an eruption all over the tongue, along with herpes on the face. Salivation may occur with the outbreak. The affection may be limited to the lingual branch of the fifth nerve, but this occurrence with facial paralysis suggests that the chorda tympani fibres are then involved. When hemiglossitis occurs with facial herpes, it

indicates a lesion of the branches of the fifth nerve. The glossopharyngeal nerve is not alone affected, and the hypoglossal not at all. There is no special treatment beyond tonics and non-irritating mouth-washes.

Cases have occurred where an acute parenchymatous hemiglossitis has been very severe, as in Ballard's case, in which an old man, aged seventy-eight, suffered acute pain in the right occipital region, followed by sloughing of the right half of the tongue, as well as of the tip on the left side. The case indicates how difficult it is to draw the line between hemiglossitis and acute glossitis.

2. Membranous Glossitis and True Diphtheria of the Tongue.

There exists the well-known confusion between the disease called diphtheria and similar affections. As criteria of the existence of the disease we have the discovery of the Klebs-Löffler bacillus, identified not only by staining, but by cultivation and inoculation of the pure cultures into susceptible animals. But with regard to these latter tests there are variations, especially in regard to the inoculations, for the bacilli, whilst in other respects conforming to the type, are either not pathogenetic, or are so in a less degree than the true variety. Again, there is a difficulty in that, clinically, the distinction is not always made from an epithelial desquamation into which a plastic exudation has previously taken place, so that the pellicle is composed of epithelial cells separated by fibrin and leucocytes; hence the term pseudo-membranous. All stages between the fibrinous membrane and the squamous epithelial membrane are met with.

Diphtheria of the Tongue.—By this term we have no intention of implying that the tongue is liable to diphtheria when the fauces are not affected. Indeed, the liability of the tongue to diphtheritic patches, even when the tonsils and fauces are thickly and extensively covered with membrane, is very small. Any one may convince himself of this by a glance at the tables of cases of diphtheria and membranous croup, published by the Scientific Committee in the sixty-second volume of the "Transactions of the Medico-Chirurgical Society of London;" and works on diphtheria and on the tongue contain only a passing allusion

to the possibility of the tongue being affected. When the membrane does appear on the tongue, it is almost invariably at the back part, close to the root, and it spreads on to the tongue directly from the fauces, so that the layer of membrane on the two parts is continuous. No special characters have been noticed in the membrane on the tongue, and there are no difficulties in the diagnosis, for the nature of the case is apparent from the presence of membrane on the adjoining parts, and from the constitutional symptoms of diphtheria. Nor is any special treatment necessary. The cases, therefore, in which the tongue is invaded from the fauces by diphtheria are merely of interest as showing that there is no anatomical reason why the tongue should be exempt, although the line of march of the disease is very rarely in the direction of the tongue, or, indeed, as far forwards as the tongue. The disease has a very much greater predilection for the air passages.

A true case of primary diphtheria of the tongue is described by Wharton. A boy of six became ill, with difficulty in swallowing and a swollen tongue. The next day a thick membrane covered the whole dorsum; there were also small patches on the lips and inner surface of the cheeks. The submaxillary lymph glands were markedly swollen. The membrane was peeled off and the swollen tongue incised freely, only blood and serum escaping. The Klebs - Löffler bacillus was cultivated and the diagnosis was confirmed by inoculation of the pure culture made into guinea pigs. The diagnosis of this rare affection of the tongue is all the more important on account of the beneficial effect of the antitoxin.

Membranous Glossitis. — The membranous inflammation of the mouth and tongue which has sometimes been called diphtheria, in which an operation or other wound has become covered with a layer of white membranous material, is produced by streptococci and staphylococci. These membranes have been met with in children after measles, scarlet fever, etc., and the patients may at the same time suffer from impetigo and eczema of the skin, lips or scalp, due to the same organisms. A similar

condition has been seen in exhausted adults. In the case described by Hall, a girl, aged nineteen, who had been in the ward some time with acute nephritis, after several patients in the same ward had suffered from follicular tonsilitis, was attacked with acute membranous inflammation on the right side of the tongue. The thick membrane could be detached, leaving an excoriated surface. Patches spread from the tongue to the cheek; there was foetor, salivation, swelling, and protrusion of the tongue, swelling of the cheeks and face. The patient died three weeks later. Abundance of staphylococci were found in the membrane, but no bacilli. In less acute cases still the membrane which forms may consist mainly of epidermis, infiltrated and swollen by a fibrinous exudation, so that the membrane peals off in extensive leathery shreds. Hutchinson has called this form "pellicular glossitis," and notes its occurrence in a heavy smoker. A dense coherent membrane, one-eighth of an inch thick, could be detached in pieces one and a half inches square, the under surface being indented with papillæ. The tongue underneath was somewhat swollen and oedematous. The patient experienced a continued detachment of these pellicles, which produced a leathery sensation. This kind of membrane approximates to that of the affection called by Wunderlich "dissecting glossitis." The treatment of all these membranes is to detach them if possible, and paint the surface with perchloride of mercury (1 in 1,000), and this has to be repeated if the membrane re-forms. Diphtheritic antitoxin is indicated only when the typical bacilli are found.

3. Thrush.

Synonyms : Lat., aphthæ ; Fr., aphtes, muguet ; Ger., Soor (syn., Schwämmchen). An affection in which *saccharomyces albicans* (syn., *odium albicans*) is found. The foregoing are the names given to this disease in the "Nomenclature of the College of Physicians of London," third edition, 1896. The only way of avoiding hopeless confusion is to confine the use of the words aphthous and thrush to the disease in which the *saccharomyces* are found. The words have been used in a very loose way. Aphthæ and aphthous simply imply inflammation, and thrush has been used for

almost any inflammation and ulceration of the mouth of children, also for inflammation and suppuration in horses' feet. Some use the term aphthous stomatitis for the same affections as are called herpetic. Bednar's aphthæ is the name given to small excoriations seen in the mucous membrane covering the hamular process in young infants. There is an illustration of it in the "Atlas" by Mikulicz and Michelson; it is said to be caused by roughly wiping out the child's mouth. The membranous inflammations which have been just described have also been termed aphthous. It is as well to avoid the use of the term "membrane" in relation to thrush. Severe cases of thrush show, along with the special parasite, streptococci and staphylococci, and these organisms may, by complicating the thrush affection, produce a fibrinous membrane which can be peeled off, a secondary membranous glossitis superimposed upon the aphthæ.

Clinical Description.—Children who are brought up by hand are the usual subjects of thrush. The disease commences with slight indisposition, which may be of several days' duration or may last only a few hours. If the mouth is examined at this time, the mucous membrane, especially that covering the tongue, is observed to be of a much deeper red than usual; the redness is not in patches, but is uniform, and the surface of the tongue is sticky and has an acid reaction. In the course of a few hours tiny white patches, like bits of curd, appear on the tongue, especially near the tip and edges, on the inner aspect of the lips, on the inside of the cheeks, especially near the angles of the mouth, and in smaller number and less frequently on the gums. They are at first circular, and as they increase in size, still, for few days, retain their circular outline. But if the disease continues to advance, they coalesce and form a continuous layer which may extend over the whole tongue (except, perhaps, the centre of the dorsum), the inner surface of the lips, cheeks, soft palate, uvula and tonsils, so that all these parts are covered by a thick layer of material which has rather a creamy than a dead-white hue. The disease may even extend to the pharynx and oesophagus, but it does not attack the larynx and trachea, being fortunately, as Vogel has pointed out, limited in its occurrence to those parts of

the mucous membrane which are lined with squamous epithelium. The patches at first adhere closely to the mucous membrane, and although the surrounding membrane is not congested in a definite area, they can only be detached with difficulty, and with the leaving behind of deep red areas which often bleed slightly. In the course of some days they become yellower and drier, and may then fall off spontaneously, or may easily be detached, the more easily if they are still of small size and have not coalesced to form a continuous layer. After they have existed for some time they may assume a brown colour, particularly if they have been roughly handled and have been made to bleed.

During the whole period of the formation and extension of the patches the child is more or less ill; partly on this account, and partly because the mouth is sore, it does not care to suck. The bowels are usually relaxed, and in many instances there is troublesome diarrhoea, with the passage of green and sour-smelling stools. The child becomes in the worst cases torpid and drowsy, and if the diarrhoea continues, the anus and buttock are irritated, and become red or actually sore. In some cases patches resembling those in the mouth have been noticed on the buttocks, and this, no doubt, together with the occurrence and persistency of the diarrhoea, has given rise to the popular belief that the thrush passes completely through the child. In very bad cases the nipples and genitals have been affected.

The *course* which the disease runs depends in large measure on the conditions in which the child is placed. It is a matter of common observation that patients who are attacked by thrush in private practice almost invariably recover, while children who are attacked by thrush in large foundling establishments are much more ill, and much more liable to die. In fact, in the continental foundling hospitals the mortality from thrush has often been enormous. The difference might, perhaps, have been attributed to the less healthy condition of the patients at the time they were attacked by the disease; but experience has shown that the observance of strict cleanliness is more effectual in preventing and in curing the disease than any other means. Children who are well managed and carefully treated usually recover

without any grave symptoms in the course of a few days. Children who are not managed and treated well are very subject to enteritis; they become exceedingly emaciated, are unable to take food, are weakened by continual diarrhoea, and at length die exhausted. The thrush of adults is even more fatal than that of children, or, to speak more correctly, is followed by a greater mortality than the thrush of children; for the disease is not itself a cause of death in adults. It occurs almost only in adults who are the subjects of slowly progressive and fatal diseases, phthisis and cancer, for example.

Children *who die of thrush* present, on section, the white membrane in the mouth, and, perhaps, down the œsophagus as far as the cardia, but not in any other part of the intestinal tract. The most constant occurrence, in addition to the membranes, is that of inflammation of the follicles of the small intestine. West states that twenty-one of twenty-six bodies of children who have died of thrush present these appearances in the small intestines. The presence at death of the white patches in the mouths of children who have been suffering from thrush for a considerable period is explained by the circumstance that the membranes re-form after they have been detached, and the re-formation may take place frequently in the time between the first appearance of the disease and death.

The curdlike masses which cover the surface do not form a membrane, for there is no fibrinous exudation, nor any peeling off of corneous epithelium. They are whitish layers, consisting of epithelial and formed *débris*, besides various organisms, but especially the threads and spores of *saccharomyces*. The layers cannot be peeled off, only wiped off. The filaments are composed of rows of elongated cells, 15 to 20 μ long and 2 to 6 μ thick (the diameter of a red blood corpuscle is 7 to 8 μ). The spores are round or slightly oval cells, 6 to 10 μ in diameter, which lie in the meshes of the filaments. The organism has been found also in the dried milk on a dirty jug, in the stools, in scrapings from the buttocks. In plate cultures the organism forms pure white colonies, having raylike filaments in the depth. It grows also upon potato, carrot, and bread, but

does not grow in sterilised milk where no acid is present. *Saccharomyces* is able to act upon sugar by fermentation, producing, from milk sugar, lactic, butyric, and formic acid. Pure cultivations are pathogenetic, especially if injected into the ear vein of rabbits, the fungus lodging in the small vessels as emboli, and the mycelia penetrating into the tissues. Mycelia have been shown penetrating the oesophagus of a child, and the organisms have been found in the spleen and kidney, along with pyogenic organisms. The multiplication of the organism is by fission, as in ordinary yeast. A similar disease is seen in foals and calves.

In considering the part played by thrush, it cannot in itself be said to be virulent, and the curdy patches containing the organism may be found in the mouth of a perfectly healthy child. In order for the thrush organism to become harmful there must be :—

(a) An impairment of general nutrition, which results in a diminished secretion of saliva and a tendency to constipation. The impairment of nutrition may happen from various causes—want of proper food, exhaustion after a specific fever, etc. The diminution of the salivary secretion favours the drying of the mouth and the growth of organisms. The constipation leads to fermentation in the alimentary canal. To this preliminary bad condition Parrot gave the name “athrepsie.”

(b) The special result of the growth of the organism is the production of acids, and perhaps other substances, favourable as food material for *saccharomyces*. The dryness and acidity of the mouth produces the erythematous, febrile condition.

(c) The spores of the *saccharomyces* now find a favourable soil, whether they come from the air, or by direct inoculation through dirty spoons, teats, sponges, etc., from previous cases.

It seems much more probable that suckled children seldom suffer from thrush because they are not exposed to the action of the parasite. They are not, if one may use the expression, inoculated with the oidium. The nipple is soon cleaned of the last milk which rested on it after sucking; and even if the child retains for awhile some

milk within its mouth, the milk is not there long enough to be inoculated with the parasite, or is not accessible to the spores. Even if a suckled child is residing in a hospital where thrush is very prevalent, the chances of the spores obtaining access to the interior of its mouth are not great. Suckled children have no immunity from thrush in those continental foundling hospitals where the same wet nurses suckle some three children. The thrush may be easily transferred by way of the nipple from one child to the other, and the children being at the same time ill-nourished the mortality is appalling. In lying-in and foundling establishments, where great care is not taken to observe the strictest cleanliness, the conditions are extremely favourable to the spread of thrush. Milk is very largely used ; the drinking vessels are not kept clean, the same vessels are used for different children, and if one child develops thrush, the probability is that the disease will speedily spread through the establishment. Nor, in these uncleanly places, has the child a reasonable chance of recovering ; the same conditions which favoured the outbreak of the thrush favour its continuance. The spores are produced and reproduced ; the membranes are detached, and immediately re-form. The affection of the mouth is complicated with enteritis, and the children die.

Thrush is sometimes mistaken, as has been already stated, for herpetic ulceration ; but if the distinction between the two diseases is admitted, there ought not to be any confusion. Thrush is essentially parasitic, herpetic disease is not parasitic. The same curd-like patches are present in both diseases, but the patches in herpes are not so round and regular as those of thrush, and are surrounded each by a bright red areola. The children attacked by herpetic ulceration are generally much older than those with thrush. The membranes of thrush are distinguished from those of diphtheria by their whiter colour, by their situation, by the absence of foetor of the breath, of fever, and of laryngeal symptoms. In all cases a microscopical examination will decide the matter, for only the membranes of thrush are composed of the spores and threads of saccharomyces.

The *treatment* of thrush in private practice is, in the large majority of cases, very simple and effectual. The strictest cleanliness must be enjoined; the spoons and other vessels which are used to keep the milk in and to feed the child must be washed and thoroughly sterilised by boiling hot soda-water as soon as they have been used. The milk must be as fresh as possible, and between the deliveries must be kept in a cold chamber, and the nurse must be very clean, especially with regard to her hands. These precautions will naturally be the order of the day in a well-managed house, and in such a house thrush ought never to occur; for it may be said with truth, that if the milk is sweet and the nurse clean, the children will not have the thrush. The occurrence of thrush, on the other hand, may be regarded as a clear proof that the milk is not always sweet, and the nursery is not clean. The local treatment is to remove very gently, with a piece of soft linen, dipped in a warm solution of carbolic acid or Condyl's fluid (in either case very weak), the patches of membrane as they form, then burning the wiper. The patches farther back in the mouth may be removed in the same way, or, better still, with a soft camel-hair brush, which must be thoroughly cleansed by removing the membrane from it after it has been used, and keeping it in a solution of carbolic acid. West recommends the use of a solution of half a drachm of borax and one drachm of glycerine in an ounce of water, and in more severe cases, a solution of two grains of nitrate of silver in an ounce of distilled water twice a day, the borax solution to be still used on all other occasions of cleansing. Borax and honey should not be used; for although the borax is good, the honey, as Vogel has very properly pointed out, is bad, the sweetness tending to increase the acidity of the mouth, and to favour the development of the fungus.

In establishments in which thrush is very prevalent, it is quite clear that the management is at fault; and the sooner this is altered, the sooner will the disease disappear.

The harmful methods of preserving milk for transit by adding boric or salicylic acid is a fertile source of infantile summer diarrhoea, and markedly predisposes to thrush. Unless absolutely pure and fresh milk can be obtained, it is best to exclude the milk altogether from the diet, and

keep the child on meat juice and extracts for a few days. Even sterilised milk in sealed bottles, owing to the variations in samples, cannot be always relied on, although valuable if genuine.

4. Aphthæ Epizooticæ, the Foot-and-Mouth Disease of Animals (syn., epizootic stomatitis; Fr., fièvre aphteuse; Ger. Maul und Klauenseuche).

This is a rare, in its severe form a practically unknown, disease in this country, the chief interest of the subject being to afford a possible explanation of epidemic forms of glossitis traceable through the milk supply to diseased cattle. Single instances have been noted in this country. For instance, a farm-boy who had to do with cattle was seen by Spencer with acute superficial glossitis and vesicles on the tongue, the cattle on the farm at the time suffering from foot-and-mouth disease. But it is through the researches made near Berlin by Siegel and others, including the report of a special commission upon the subject, that the direct connection between the disease of cattle and human beings is based.

Foot-and-mouth disease attacks especially cattle and pigs. It occurs in widespread epizooties, or remains limited to a group of farms, and it is especially spread over wider areas by travelling cattle. After a very variable period of incubation, from a day or two up to several weeks, the shortest period being the cases of direct inoculation, during which there is febrile disturbance, there occurs swelling of the tongue, with vesicles going on to ulceration over the mucous membrane of the mouth. There is salivation and difficulty of taking food and drink. This is followed by vesicles and ulcers on the feet between the claws. In pigs the vesicles are mainly confined to the feet. In severe cases there is gastro-intestinal inflammation, also of the liver and kidney, but it is to be noted, as distinct from anthrax, etc., that the spleen remains normal. The main feature of the disease may be the gastro-intestinal inflammation.

A connection of this affection with man was first noticed by Sagar in 1765. The monks of a monastery in Moravia, who lived largely on milk, were attacked by a vesicular eruption on the tongue, cheeks and lips, and the eruption

spread to the arms and hands. The vesicles burst and left an excoriated surface. At the same time a fever was raging among the cows which supplied the milk.

The observations in particular of Siegel were made near Berlin, in suburbs inhabited by the working class, in which the disease corresponded to the areas supplied by particular dairies. Not only children, but women and, to a less extent, men were affected, some fatally; the characteristics of the disease, besides severe febrile disturbance with gastro-enteritis and diarrhoea, being the occurrence of a superficial inflammation affecting the tongue especially, but also the rest of the mouth, and to a less extent the mucous membrane of the pharynx and nose. Vesicles, and then ulcers formed, the gums were affected and became in a peculiar manner retracted, as shown in Siegel's illustration. Also an urticarial or measles rash appeared on the skin, which sometimes went on to the formation of vesicles. The vesicular eruption occurred on the limbs, and might attack the fingers and toes, especially around the base of the nails. In bad cases the vesicles on the tongue were followed by dusky red ulcers, covered by a milky, fibrinous exudation, and at the worst the tongue swelled so much as to protrude from the mouth, as it does in badly-affected cattle, but without ever going on to suppuration.

The disease has to be distinguished clinically from typhoid fever, scurvy, etc., and this seems to have been rendered more easy by the recognition of a short bacillus by Siegel, which was found in the earlier stages in the vesicles on the tongue, also in the motions, where it could be isolated from the colon bacillus, and in the internal organs, liver and kidneys of human beings and animals dying of the disease. The transference of the disease in cattle was found to be especially through the saliva slobbered over the food, or directly rubbed in by contact; also it might be carried to the calf through the milk and through the faeces. The most certain way of transferring it was by inoculating the pharynx of a calf with the saliva or milk of an animal in the earlier stages of the disease. Milk of an infected cow was swallowed by Hertwig and two assistants, and they suffered from the disease. Pure cultivations of Siegel's bacillus could be obtained from the early

vesicles on the tongue of children, and the pure culture being inoculated into a calf, pure cultivations of the bacillus were recovered from the vesicles on the tongue and feet, and from the internal organs.

These facts being recognised, measures are now taken to prevent the sale of milk from cows affected by foot-and-mouth disease, and the cows are isolated or killed, and are not allowed to be moved. Hence it may be anticipated that this affection of the tongue will disappear.

A vesiculopustular disease of the mouth occurs in epidemics amongst children, unassociated with any eruption elsewhere and quite distinct from thrush. It consists in numerous vesicopustules disseminated over the lips, gums, buccal mucous membrane and tongue, which may by secondary changes lead to gangrenous patches. Dr. Colcott Fox, who has given us this account, has seen a number of cases. He finds the most effective remedy to be painting with resorcin, 20 grs. to the oz. of glycerine. It is very probable that this disease is spread through milk.

CHAPTER VII.

SUB-ACUTE AND CHRONIC SUPERFICIAL GLOSSITIS.

Erythema Migrans or Wandering Rash—The Raw, Excoriated Tongue—The Furrowed or Sulcated Tongue—Dissecting Glossitis—Glossodynbia Exfoliativa—Herpes of the Tongue.

VARIOUS forms of inflammation come under this heading which doubtless in some cases are difficult to distinguish from one another, but on the whole may be classed under three groups, (1) in which there is superficial inflammation and desquamation of the epithelium only, (2) characterised by the formation of vesicles, which may dry up or go on to form ulcers, and (3) thickening of the corneous layers of the epidermis.

(1) **Erythema Migrans or Wandering Rash** (Fr., exanthème ambulant; Ger., Erythem).—This is an affection which has a most extraordinary number of names, suggested by some one of the clinical phases in which the affection has been seen. Thus, names have been given from the apparent resemblance to skin diseases—pityriasis, lichen, intertrigo, and eczema; other names have been given from the character of the rash, such as ringworm of the tongue. The term “geographical tongue” is scarcely such as one likes to use to denote an actual disease; it is a German name, applied to the disease partly because it is difficult to find a thoroughly suitable name, and partly because the peculiar marks on the tongue suggested a similarity with the irregular outlines of the divisions on a map. Other names fail to be satisfactory because they mark only one of the shifting phases of the disease; such are: “état tigré,” dotted or spotted; “kreisflechige,” or “circinata”; “eczema en aires,” “eczema marginée”; “des-

quamative, exfoliative glossitis." Others are true but indefinite, "benign plaques," given it by Caspary, "superficial excoriations," etc. The name of Möller has sometimes been connected with the affection by continental authors, but the disease was well known long before his writings.

On the whole, we prefer the name recommended by Barker, "wandering rash," for the peculiar and variable markings on the surface of the tongue and the way in which they change their position justifies the term "wandering." This is also the nomenclature adopted by the College of Physicians.

The first description of this affection appears to have come from France, and was published by Bridou in an Inaugural Dissertation in 1872, and by Gubler in the "Dictionnaire Encyclop. des Sciences Médicales" (art. "Bouche"). But the articles of Bridou and Gubler excited very little attention at first, unless perhaps in France.

Wandering rash is *not* by any means a *common* disease; and it is very seldom observed by men engaged in large general hospitals, for it occurs much less frequently in adults than in children. The best opportunities for studying it are afforded in children's hospitals and foundling establishments, and it is seen much more frequently in the out-patient departments of the children's hospitals than in the wards. Yet, although it is essentially a disease of children, it has been occasionally observed in adults. Both sexes appear equally liable to it.

The *disease consists* of one or more patches on the dorsum of the tongue, which at first are very small, having no greater diameter than that of a pea. They are then smooth, red, and on the same level as the surrounding surface of the tongue, although they may appear to be slightly depressed, or even a very little elevated, according to the condition of the dorsum and the thickness of the fur. The filiform papillæ have been shed, but the fungiform papillæ may remain, and may even appear more prominent by reason of their isolation. The patch soon spreads, and becomes a ring, either circular or oval. All the centre of the ring is smooth, and generally a little redder than the normal mucous membrane, but it is not unusual for the redness to grow more intense towards the border of the ring. The border itself, however, is not red, but

faintly or more decidedly yellow; it is even described by some of those who have written on the subject as golden yellow; and is usually slightly raised, sharply defined. The patches form almost invariably on the dorsum or borders of the tongue, and are more commonly observed towards the tip than elsewhere; but they may affect any part of the dorsum in front of the circumvallate papillæ (Plate VI., Fig. 1). They are not inflamed, and do not present any evidences of surrounding inflammation, either past or present. Occasionally they are observed on the under aspect of the tongue, near the tip, but they have generally extended to the under aspect from the dorsum.

If one of the patches or rings is watched, it is observed to grow larger, until, widening out, it reaches the border of the tongue. Then losing its circular or ring shape, it forms the segment of a circle, the other segment of which may be found on the under surface. Several rings on the same half of the dorsum, thus widening out, intersect each other; but the intersection is not complete, for where they come in contact the border of one of them ends abruptly, while the border of the other, as if stronger than its neighbour, continues to advance unbroken. The meeting of the rings and the peculiar marking of the dorsum of the tongue which is produced by it led to the name "geographical tongue." As the circles widen out, so may they contract again, until each and every circle may disappear from the surface of the tongue; but the rapidity of the subsidence is often so great that the surface of the tongue does not instantly regain its normal aspect; it is slightly redder and smoother than natural. Again, as the circles expand fresh patches may form in their interior, and widening out in turn, may form rings within rings. So, fresh rings may form in areas from which the former rings have only lately disappeared. In all these changes the circles preserve their original character of smooth red centres and slightly raised whiter or yellowish borders. The regularity of the outline of each ring is not, however, always strictly maintained; it may be crenate, or present projections here and there.

The wandering rash produces so few *subjective symptoms* that it is frequently present for a long time before it is

PLATE III.

Fig. 1.—Ulcer due to the rubbing of bad teeth, with sloughy surface and slightly raised red base.

Fig. 2.—Tuberculous ulcer of tip in a woman, 45 years old.

Fig. 3.—Lupus of fore part of tongue in a woman, 23 years old, with lupus of face and nose. The mouth is opened, the lower lip is everted and the seat of a sloughy ulcer, and the tongue, which cannot be protruded, is seen through the slightly parted lips.

Plate III.



Fig. 1.



Fig. 2



Fig. 3

discovered ; or, to speak more correctly, it is frequently discovered only by accident, either by the parents of the child or by the doctor when the tongue is examined for some other reason. Indeed, in many cases there are absolutely no subjective symptoms. Occasionally itching is complained of ; and the two patients whose cases are recorded by Barker suffered extremely from the itching of the patches. In these cases, too, the itching was accompanied by very troublesome salivation ; but these symptoms are unusual.

Of the *cause* of the disease little or nothing is at present known. It was for a long while believed to be parasitic, but the parasite has yet to be discovered. It has repeatedly been maintained to be due to syphilis ; and Parrot, who had had many opportunities of observing it, was a very strong believer in the syphilitic origin. But Parrot was so firm a believer in this theory, that the appearance of the eruption on the tongue of one of his foundling children appeared to be a sufficient reason for declaring the child to be affected with congenital syphilis.

Fournier has frequently discussed this opinion of Parrot's, with which he does not exactly agree, but would class many of these children in his well-known "parasyphilitic" category. He has seen children showing other signs of congenital syphilis, in whom the rash on the tongue held the same relationship to the congenital syphilis as does general paralysis of the insane to tertiary syphilis. It is a lesion caused by the syphilis, but is not amenable to anti-syphilitic remedies.

The more general view is that it is not due to syphilis, congenital or acquired, the term "mucous tubercles" being strictly confined to true syphilis. If it does occur in a congenitally syphilitic child, it is the result of debility. Parrot's view may be discounted, seeing that he held much the same as regards rickets.

The only condition which can in any way be regarded as a cause, either predisposing or exciting, is debility. Unna, Barker, and Caspary have all seen cases of wandering rash in delicate children ; but there is no further evidence to show in what manner the disease is related to debility : it does not appear especially to depend on a weak digestion.

Unna thinks that it is connected with dentition, but it occurs in some children before the period of the first dentition. The children are sometimes scrofulous and have eczema of the skin. A most characteristic case was noted by Spencer in a boy upon whose tongue the mother had seen the rash when he came out of the scarlet fever hospital a year before. The rash had continued with daily variations, but had not caused any symptoms, and no treatment had been adopted.

It is not surprising that the rash should have been regarded as due to the effect of a parasite; it resembles ring-worm in the rings it forms, in their slightly raised borders, and in the appearance of spreading at their borders which the rings present. And it is so easy to discover parasites (*schistomycetes*) on the surface of the tongue, since so many of them exist there naturally. But the most careful examination has failed hitherto to discover a parasite which is not of common occurrence upon the surface of the normal tongue. The parasitic theory has therefore been almost universally abandoned, and the pathology of the disease is still an open question. Hutchinson mentions in a case of his a tendency in other members of the family to sores on the lips and in the mouth. The microscopic anatomy has been described by Parrot, who had an opportunity of examining a section of the tongue affected with wandering rash. He says that the epithelium at the level of the patches is tumified and thickened; the cells of the horny layer are augmented in size; the cells of the Malpighian layer are also augmented, and exhibit signs of proliferation. In the papillæ and the subjacent portions of the derma around the vessels are a large number of lymphoid cells. He regards the derma as the essential seat of the disease, and in this opinion Caspary agrees with him; for, as Caspary truly says, the red spot is often found without the whitish or yellow border, the border never without the red spot. It may be considered to be a sub-acute papillitis, as Vanlair calls it, or, in other words, a sub-acute inflammation of the derma of the mucous membrane of the tongue. And the cause of the inflammation may fairly be sought, as most of these authors are agreed in thinking, in some peculiar nervous influence. One great

reason for accepting the theory of nerve influence is, undoubtedly, the complete absence of any indication of another cause; and the symptoms which were especially noticeable in Barker's cases (the itching and salivation) lend colour to the theory. Beyond these points, the morbid anatomy and the pathology of wandering rash are absolutely unknown.

The *course* of the disease is, so far as it has been observed, to remain uncured for many months or years. It appears to be most obstinate and unyielding to remedies, whether local or constitutional. It is, however, subject to very great fluctuations. At one time there are few or no rings visible on the tongue; at another time the dorsum is mapped out by them. When they are present they often extend over the surface of the tongue with great rapidity; even considerable changes may be observed in the course of a few hours. Parrot speaks as if each ring had a natural existence of about six or seven days, and says that the entire disease may disappear for many months, or even for years, and then break out again. Fortunately, although it is extremely obstinate, and may be regarded as incurable, so far as remedies are concerned, it is not by any means a serious evil. The worst symptoms it produces are itching and salivation—troublesome enough, in truth, yet not grave. And in so far as the disease is rarely observed in adults, or even in children over six or seven years old, the probability is strong that it undergoes spontaneous cure; for the only alternative would be that all the children who are affected with it die. Caspary, indeed, draws a more serious picture of the later stages of the malady, and tells how it forms deep and numerous cracks and fissures along the borders of the tongue, so that the previously mild complaint becomes a grave and important disease. We are familiar with this condition, described by Caspary, but have not been able yet to trace it back to wandering rash.

Before proceeding to consider the diagnosis and treatment of the wandering rash, it is worthy of notice that Vanlair has experimented upon the effect of the eruption on the sensibility of the parts of the dorsum which are affected, and finds that neither the sense of touch nor of taste appears to be in the slightest degree impaired, but

that sensibility to pain is in some instances decidedly exaggerated. This again favours the theory of the nervous origin of the disease.

The *diagnosis* of wandering rash is singularly easy. From syphilitic mucous tubercles (which occur in children as well as in adults) it may be told by the general grey surface of the tubercle, and by its much greater elevation above the level of the surrounding parts; and when the tubercle, as is not uncommonly the case, has lost its grey covering by being rubbed against the teeth or roof of the mouth, by the greater elevation of the tubercle, its persistence compared with the rash, and by the presence of other signs of syphilis. In children these other signs will, of course, be almost always those of congenital, not of acquired syphilis. The diagnosis from leucoma depends first on the fact that leucoma is a disease of adults, wandering rash of children; leucoma consists of pearly patches, which sometimes have red borders and always red bases after the removal of the coating, while wandering rash consists of red patches, which have usually a whitish or yellowish border; leucoma advances very slowly, while wandering rash changes from day to day, and sometimes from hour to hour. Leucoma and smoker's patches occur, too, on other parts of the inside of the mouth besides the tongue, while wandering rash has never yet been observed on any other part than the tongue. The condition, for it can scarcely be called a disease, most likely to be mistaken for this disease is the circumscribed bald patch which is occasionally seen on the tongues of children and adults, and which is described under the heading of smooth tongue. The distinction is chiefly in the absence of the whitish or yellow collar in the simple smooth patch, and in the circumstance that the simple smooth patches do not necessarily form complete rings, and when they do so, the centre of the patch or ring is not bald all over.

It has already been more than once remarked in this section that wandering rash is very little, if at all, amenable to *treatment*, whether local or constitutional. In fact, so far as local treatment is concerned, no remedy appears to exercise any influence on the course of the disease.

Even the symptoms of itching and salivation do not seem to be allayed by any of the local remedies which are usually employed in the medication of diseases of the tongue. It is well, however, to try the effect of remedies when the eruption is accompanied by these annoying symptoms, since it does not follow because they are not generally useful that they never will be of use in an individual case. Slightly astringent lotions, tannin, alum, sulphate of zinc and chloride of zinc; soothing lotions, borax, chlorate of potash, solution of chromic acid, etc., may all be used in turn, together with any other remedy which may seem desirable.

The constitutional treatment which is indicated in most cases is tonic; and iron and cod-liver oil may be administered with advantage to the children who suffer from wandering rash. The administration must be maintained over a long period of time if a hope is entertained of curing the disease, or even of producing a decided effect upon it.

When the almost, and in some cases quite, trivial character of the affection is considered, the treatment which is recommended by some of the authors who have been quoted is almost ludicrous. Vanlair, for example, after saying that the treatment cannot yet be formulated in a definite manner, proceeds to recommend that arsenic and sulphur should be tried in the form of mineral waters, with purifying medicines and general baths, and that the iodides and bromides should also be employed. Locally, he recommends honey, gum, and guimauve, and later tannin, chlorate of potash, and other lotions. And for diet: milk, soup, eggs, green vegetables, fruits, white meats, water, light wine and water, and slightly alkaline mineral waters (Schalheim, Apollinaris, Bilin, Vals). For children under three years old this treatment seems a little advanced, to say the least of it.

But the local treatment recommended by Unna is still more peculiar, when the extreme youth of most of the patients is borne in mind. The following solution is to be prepared: Aq. sulphuros; aq. menth., $\ddot{\text{a}}\ddot{\text{a}}$. 100; flor. sulph.; syrup. simpl., $\ddot{\text{a}}\ddot{\text{a}}$. 20; guin tragacanth, 2. The mixture is to be well shaken before it is used. Three times a day, after careful cleansing of the mouth, the patient takes a

mouthful, holds it in the mouth about five minutes, and works it into all the corners and angles. This washing may be carried out three or more times in succession. Whilst it is being done, a sediment of sulphur and sulphurous acid collects in the glass; the fluid is poured off, and the sediment is taken up on a toothbrush, and brushed gently over the surface of the tongue.

2. The Raw, Excoriated Tongue (*Dyspeptic Tongue*).

In the previous section the wandering rash was described as occurring chiefly in children without evidence of any connection with dyspepsia, predisposed to by debility, an affection extremely variable from day to day, yet causing very slight symptoms, or none at all. The raw, excoriated tongue is included here because, in the chronic forms, it may be shown microscopically that the surface of the tongue is affected by sub-acute and chronic glossitis. The more severe form of dyspeptic ulceration will be described later. As compared with the wandering rash, it is an affection of adults, and connected with gastric disturbance, the patients often being in the best of general health. Even if started by some slight traumatism, it is the dyspeptic irritation which continues the sore. As in other cases, it is necessary to distinguish this tongue from any condition produced by syphilis. A more important factor as giving rise to the dyspepsia is gout.

Without being actually ulcerated, the surface of the tongue may be excoriated or raw, and the rawness may be due to one of several causes. Dyspepsia and injury are among the most common causes, and excoriations are very frequently observed on tongues which are affected with chronic superficial inflammation. The excoriations themselves, whatever be their cause, bear much the same characters, and one general description will suffice for all of them. The surface of the tongue is smooth, quite deprived of papillæ over the affected area. It is redder than natural, and its rawness is quite apparent. The margin of the raw patch or area is sharply defined, but the area has no depth: it is merely a part of the surface of the tongue from which the whole thickness, or part of the thickness, of the epidermis has been removed.

Although the appearance of the raw areas varies very little, the extent of surface which is cleared and the surroundings of the areas vary considerably. Raw places which are produced by the burning or scalding of the dorsum are usually very limited in extent, and quickly heal. For a day or two they are tender when touched, and when very hot or sharp or spiced food passes over them, but the tenderness speedily disappears, and the sore heals.

The raw places which are associated with dyspepsia often cover a considerable area of the surface of the tongue. The whole of the front part of the dorsum may be red and raw, deprived of its filiform papillæ, while the fungiform papillæ still remain, and look more numerous and striking, owing to the absence of the filiform papillæ, which naturally partially obscure them, unless they are much swollen and preternaturally red. The thick fur which invariably covers the back part of the dorsum makes the absence of fur on the front part, and its redness and rawness, more conspicuous (Plate I., Fig. 3). Tongues of this kind in young persons are sometimes seen in the out-patient room, and are probably not solely due to dyspepsia, but to sucking the tongue or rubbing it against the teeth. But it is not easy to obtain a history of this. Hack has described superficial excoriations of the tongue occurring in certain families. In two families and in three generations he observed a row of long oval areas, separated sharply from the surrounding parts by a golden border. They were situated on the borders and at the tip. In most of the individuals they commenced in early childhood, and in some of them the tongue was strikingly smooth over large areas, with red flat excoriations here and there. There was no history of syphilis in any case. In order to ascertain whether or not such raw places were of common occurrence, Hack examined the tongues of 600 soldiers, and found a similar condition in twelve of them. Hack's original paper is not within our reach, but the abstract of it in Schmidt's "Jahrbücher" (1883, 197, 128) does not offer any explanation of the cause of the raw places either in the two families or

in the twelve soldiers. In the two families it is not improbable that the mucous membrane of the dorsum of the tongue was thinner and more easily destroyed than natural, as the skin in some persons is much more delicate and vulnerable than in others.

The excoriations which so frequently occur on the tongues of persons who are the subjects of chronic superficial glossitis are almost always due to slight traumatism or dyspepsia, and the frequency with which the surface of such tongues gives way is not surprising when the extreme thinness of the mucous membrane is considered. The natural thickness of the epidermis is diminished by more than one-half, in some places by as much as two-thirds, and although the superficial layers of epithelial cells are often harder, and more like the horny layer of the epidermis of the skin, the protection they give is not so great as that afforded by the epithelium of the natural mucous membrane. In addition to the thinning of the epithelial covering, the subjacent tissues are always in an irritable condition, of which there is ample proof in the readiness with which the mucous membrane inflames, and in the large number of vessels and the many leucocytes, or cells like leucocytes, which are seen with the microscope in perpendicular sections of such tongues. The consequence is that an injury which would produce no appreciable effect on a healthy tongue (such an injury, for example, as the passage over it of food a little too hot, or rather more rubbing than natural) suffices to produce an excoriation, and the excoriation is more troublesome and much more difficult to heal than if the tongue were healthy. On these inflamed tongues it is almost rare not to find a raw place here and there, and even when the stage of actual inflammation is passed, it is easily lighted up afresh, and new excoriations form.

Goodale and Hewes describe the case of a man, aged thirty-eight, who had suffered from a dyspeptic tongue for four years. He had been scarcely ever free from it, although it was subject to variations. On cutting out a portion and examining it microscopically excessive epithelial proliferation and small-celled infiltration below the epidermis was noted.

The patient suffered much from dyspepsia, and there was a diminished secretion of the acid of the gastric juice. The fermentation in the stomach was prevented by administering salol. The tongue then became normal, and continued so as long as the patient took the salol.

The local treatment of dyspeptic and raw tongues is by the use of chlorate of potash as a mouthwash, or as a lozenge; also borax and honey may be painted on. The soreness may be improved by an astringent paint, chromic acid, 10 grs. ad oz.; also by treating rough and carious teeth, and improving ill-fitting plates. But the chief treatment is directed to the relief of the dyspepsia, and if that can be done, the tongue may be expected to get rapidly sound and to remain so.

Gouty dyspepsia, which is often associated with this variety of disease, must be treated by careful dieting and appropriate remedies.

3. Furrows or Grooves, and Wrinkles.

Furrows, fine linear depressions, or wrinkles, are met with on the dorsal aspect of the tongue in many persons, and are not necessarily tokens of disease, either past or present. In most persons there is such a furrow, which in some amounts almost to a fissure, in the middle line of the tongue. It varies in length from a few lines to an inch or more. Its edges can be separated easily by drawing them apart with the fingers, when it is seen to be quite smooth and without papillæ or fur, although the papillæ reach quite up to it on either side and the tongue is generally coated. This median furrow is not, in the natural state, ulcerated or excoriated, but is liable to become sore more early than the surrounding parts when the surface of the tongue is inflamed; and the excoriation, or ulceration, is then not easy to heal, on account of the constant contact of the sides of the furrow.

Natural furrows may be observed in other parts of the dorsum besides the middle line; they are usually directed longitudinally, and vary much in length and depth. They may, like the furrows on the forehead, be curved and forked; but they have not the same signification as the wrinkles on the forehead, for they are not signs of age, or, so far as we

know, of care and anxiety. They may be observed on the tongues of quite young persons, but are not so frequent in them as in older persons: they are frequently due to the compression of a tongue a little too large to lie smoothly stretched out within the circle of the teeth. They are, therefore, in many instances, evidence of some past and, it may be, temporary inflammation, or hypertrophy, which has not completely subsided. All these furrows bear the same general characters of smoothness of the interior of the depression, a complete absence of fur, a complete absence of induration about their borders, and the possibility of removing or smoothing them away momentarily by drawing apart their sides.

Their presence is not usually noticed by those whose tongues present them, and if it is noticed it is regarded as a curious phenomenon. Medical assistance is very rarely sought for their removal, and only by the highly nervous or eccentric. They are not amenable to treatment, nor is treatment needful.

Inflammatory furrows are not uncommon in tongues which are the seat of chronic superficial inflammation, and they are still more common in tongues which have been the seat of deeper limited chronic inflammations, which, after subsiding, have left the tongue enlarged. Of this latter class the following is an example. A gasfitter had been accustomed to drink a tolerably large quantity of rum each day, until his tongue became affected, and to smoke two or more ounces of tobacco every week. About two years before he applied for relief at the hospital the fore part of his tongue had been swollen, red, and sore, and although he had abandoned smoke and drink, the inflammation had endured a long time, and had left the tongue permanently larger than it was before. A large segment, chiefly of the front and right side of the dorsum, was swollen, and mapped out by numerous furrows, which, running over it in all directions, surrounded many small islands covered by perfectly smooth red mucous membrane. There was no ulceration of the bottom of the furrows, some of which were so deep and narrow that they might fairly have been termed fissures, and they could all be smoothed

out by the pressure of the fingers on each side of them. He came, not on account of the furrows, but because he was so frequently annoyed by the soreness of the islets which they surrounded. By reason of their prominence they were perpetually subject to friction from the teeth and from the food passing over them, and so became excoriated and inflamed. In this and similar cases the furrows and the raised areas between them may bear no direct relation to each other, but be the results of a common cause, the compression of a portion of a tongue which is enlarged. The furrows can scarcely with precision be termed inflammatory, for they are only an indirect result of inflammation, and might be due to hypertrophy from any other cause.

True inflammatory furrows are such as have been described by Wunderlich in "Dissecting Glossitis." Demarquay speaks of the condition under the title of "chronic superficial glossitis," and says that this dissecting glossitis resembles the papillary form of acute superficial glossitis (whatever that disease may be), from which it only differs in the depth of the furrows with which the surface of the tongue is covered. Demarquay speaks of it as a very rebellious malady, of which the cure is often incomplete, the surface of the tongue retaining almost always afterwards a more or less mammilated aspect. An excellent example of this disease was in the tongue of a young man under the care of Sir W. Savory, in St. Bartholomew's Hospital. He had been for some time a patient in the ward, and had submitted to amputation of the thigh. The progress towards recovery was slow, and was interrupted by a rather acute attack of superficial inflammation of the tongue, which did not affect its entire surface equally or in the same manner, but produced with great rapidity a large number of interlacing furrows, all of them very superficial, and many of them excoriated and very sore at the bottom. The surface of the tongue between them was smooth, redder than natural, and free from papillæ and fur. The appearance of the whole was not unlike that presented by an old painted door, which through age and exposure to the sun, has cracked and dried, so that its former smooth surface is broken up and mapped out by vast numbers of intersecting lines and furrows. It

was thought at first that the disease was due to past syphilis, but there was no history of syphilis, and there was no other symptom to denote that the patient had ever suffered from syphilis. Further examination and consideration of the case led us to believe it to be an example of the more acute variety of superficial glossitis described by Demarquay and Wunderlich, but differing in one respect from what may be called "their" disease in the shallow depth of the furrows.

Both diffused and limited inflammations of the surface of the tongue may lead to scattered furrows, which are often permanent, especially when they have been preceded by actual ulceration (Plate II., Fig. 1).

Furrows which are due merely to compression of the tongue within too narrow limits can only be treated with success by such means as will reduce the enlargement, which is the prime cause of their existence. It is not usually the furrows, but the intervening areas, which we are called upon to treat, and the treatment fitted for them is such treatment as is needed in every similar condition of inflammation and excoriation of the surface of the tongue. It is described in the section on leucoma and chronic superficial glossitis, and need not be given here in detail.

Furrows of the kind first described in the preceding section may be due to *syphilis*, and are, perhaps, more often due to syphilis than to any simple cause; but even when the same appearance of the surface of the affected part is produced, the furrows can rarely be so thoroughly smoothed out, for they have far more frequently been preceded by ulceration, or have been the seat of ulceration at some later period. It seems by no means unlikely that the disease which has been alluded to under the name "dissecting glossitis" may sometimes own a syphilitic origin; but it is held to be quite unconnected with syphilis by Demarquay.

Under the term sulcated tongue, Hutchinson describes an appearance of the tongue which he compares to brain coral, convolutions like the brain, "cerebriform," alternatively "fern-leaf pattern" tongue. In one case, a man, aged forty-six, distinctly remembered having it when aged twelve. Another instance was in a patient aged forty-four, and in both instances there was a gouty history, but no evidence of syphilis.

In all cases of furrows upon the tongue which are liable to become inflamed, it is very important to keep the furrows clean and free from germs by painting a mercurial solution, perchloride, biniiodide, or bicyanide, 1 in 1,000, upon the tongue night and morning, afterwards rinsing out the mouth with water.

4. **Glossodynbia Exfoliativa.**

This form of superficial glossitis connects itself with neuralgia of the tongue (Chap. XII.), the only difference being the actual evidence of inflammation, and, in addition, the separation in a more or less marked degree of the corneous layers of the epidermis. The name was used by Kaposi, who wrote at length on the subject. It generally occurs in poorly nourished, anaemic, and neurotic women, who complain of burning pain set up by mastication and by continuous speaking, the pain being sometimes termed unendurable. Bright red spots and streaks or patches are seen on the separation of the epidermis, through which the papillæ appear enlarged owing to the infiltration by inflammatory cells. The affection is, on the whole, chronic; quiescent intervals alternate with exacerbations, and the disease may go on for years. There is great difficulty in eating, owing to the pain. Treatment is not a success, the application of increasing strengths of nitrate of silver gives relief by forming a protecting pellicle. The actual cautery has been recommended with the object of destroying the nerve ends.

5. **Herpes of the Tongue.**

A group of affections characterised by the formation of herpetic vesicles surrounded by a zone of inflammation. The vesicles very speedily rupture or become pustular, after which they may dry up, or the epidermis may peel off, leaving an ulcer. The term "hydroa" is also used. The term "aphthous" is largely employed, but, as mentioned before, this term should be applied only as equivalent to thrush.

The term "herpes" is justified by the similarity of the affection to herpes of the skin, viz. the rapid formation of vesicles upon an inflamed base. The vesicles form in the layers of the epidermis by the exudation of lymph,

which partly collects in them, partly infiltrates the covering epidermis. The vesicles burst at a very early stage, and the collapsed covering forms a pellicle which can be detached, exposing a superficial ulcer. This pellicle is composed of the corneous layers of the epidermis, thickened by infiltration with the fibrinous exudation. The pellicle, therefore, differs from a diphtheritic or other membrane, which consists practically entirely of fibrinous material with only a relatively small number of epithelial cells, and it differs from the pultaceous layers of thrush, in which, if uncomplicated, there is no fibrinous exudation.

The marked tendency of all forms of herpes is to recur again and again, with intervals in which the tongue becomes normal.

There are many clinical types of herpes.

One is the nervous type. A crop of vesicles forms on the margin of the tongue, with sharp pain and such great tenderness that the tongue cannot be moved, and the patient is afraid to take food. It may be accompanied by herpetic eruptions on the face, lips, and other parts of the body. It is closely connected with the neurotic form of hemiglossitis already described, except that there is no swelling of the substance of the tongue. It is particularly common in women. Michelson described several cases in which the woman had a febrile attack with burning pains in the tongue, white papules formed like peas, the contents of which soon became greenish pus. The epidermis was pushed off and jagged ulcers left, which healed in about three weeks without special treatment, but tended to recur. Another form of herpes is provoked by dyspepsia, especially when that is associated with intemperance. The patient whose tongue is illustrated (Plate I., Fig. 1) was a man between forty and fifty, hard-faced, bloated, and with all the appearance of habitual intemperance. His tongue was thickly coated towards its tip. There the mucous and sub-mucous structures were a little swollen, a little indurated. The surface was redder than the rest of the mucous membrane, but mottled with bluish-white, slightly uneven, and here and there raised into a tiny vesicle or pustule. All the diseased region

was sore and tender to the touch. The patient had suffered thus for several days, and in a few days more he was well.

Herpes of the tongue also appears in patients who have been exposed to bad weather. In one case, described by Hall, a man, aged twenty-seven, after exposure was seized with a shivering attack; an erysipelatous blush appeared on the face, and numerous vesicles formed on the lips, tongue, pharynx, arms, and hands.

In the exceptionally severe cases of herpes, where the vesicles are so large as to be termed bullæ or pemphigus, similar bullæ may appear on the skin, especially in connection with the genital apparatus, and the tendency to recurrence is very marked. Rosenthal would class these affections, including urticaria and herpes, under the term *erythema exudativum multiforme*, the pemphigus then being known as *erythema bullosum*.

Willan quotes a case reported by Dickson in 1787, in which a delicate woman, exhausted by nursing her husband through an attack of low fever, was herself affected with symptoms of fever and with a sore throat. On the fourth day of the fever there were large vesications on the tongue and insides of the cheeks filled with yellowish serum. This was followed by a general outbreak of pemphigus over the surface of the body.

A certain number of cases of herpes of the tongue, especially the persistently recurring type, occur in men who have had syphilis, there being at the same time a tendency to recurring crops of similar vesicles on the glans and foreskin. These recurring attacks are most easily excited, especially by irregularities in smoking and drinking. They are often regarded as a directly syphilitic lesion, and are occasionally quickly relieved by anti-syphilitic remedies. But this is rarely the case, and sometimes the anti-syphilitic remedies appear to do more harm than good. Perhaps Fournier's parasyphilitic theory affords an explanation. The syphilis has disturbed the patient's general health and nervous system, and the recurring herpes is one of the results.

The tongue may take part in general pustular eruptions. Pustules may occur on it in the course of small-

pox. A general pustular eruption, "impetigo," such as occurs in neglected and exhausted children, is connected in origin with the staphylococcus pyogenes, and is spread by inoculation from previous pustules. Thus, pustules about the lips may serve to transfer the infection to the mouth and tongue as well as to the skin.

The treatment of the more obstinate forms of herpes of the tongue is very disappointing. Attention to diet, the avoidance of stimulants, and careful cleansing of the mouth will meet the lighter cases. In other cases a dose of blue pill will do wonders. And, again, in some nervous patients, a grain of opium in the solid form will at once relieve the attack. But in the recurrent cases it is exceedingly difficult to know what treatment to pursue. Arsenic, which has been strongly recommended by Hutchinson, has not seemed to us to prevent the recurrence of the disease, nor has any drug appeared to exercise a decided influence on it. Close observation of some of the very acute recurrent cases led us to form the opinion that the disease, in spite of the absence of the proof of micro-organismal origin, may be contagious from one part of the tongue to other parts. Acting on this assumption, antiseptic applications have been ordered in several cases, and the experiment has thus far been more successful than any other treatment. A young lady, about seventeen years of age, suffering from one of a series of very sharp attacks of herpes, chiefly of the tongue, but not strictly limited to it, had tried various applications without relief. She was ordered to dry the tongue carefully with clean soft rag, and then to rub in all over the affected area a mixture containing carbolic acid, spirits of chloroform, tincture of myrrh, and eau-de-cologne. This she did diligently and frequently, in spite of the pain of the first applications; and with such success that the eruption speedily disappeared, and was not followed by recurrence. A delicate, very anaemic lady, about fifty years of age, suffered the most cruel tortures from repeated violent attacks of herpes of the tongue, the palate, and the insides of the cheeks and lower lip. She had been long under treatment, but without relief, and was very reduced in health, not only by the pain, but by the impossibility of taking

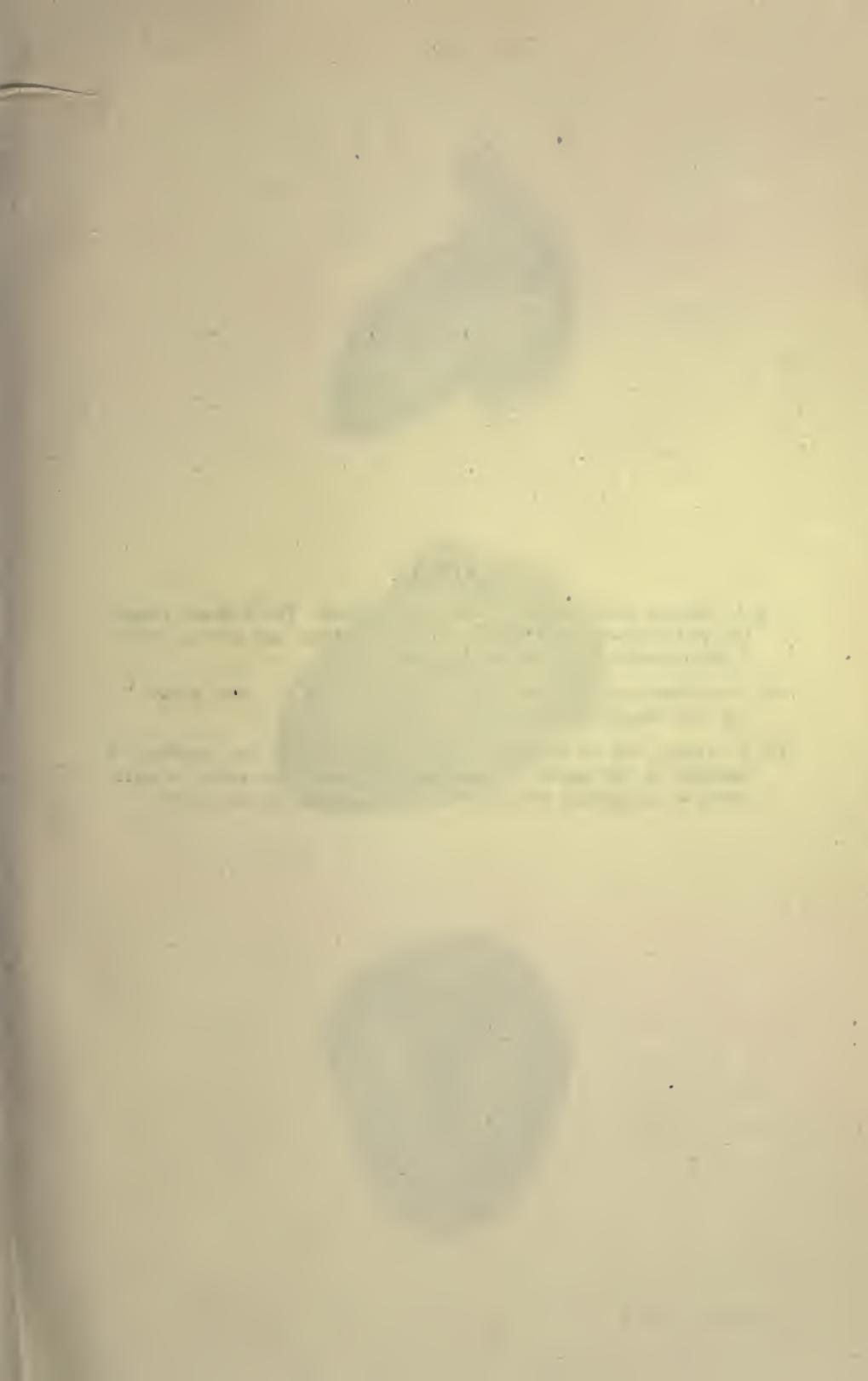


PLATE IV.

Fig. 1.—Mucous patch, deeply grooved and ulcerated. The yellower tongue-like portion towards the dorsum shows the manner and area over which it had extended in the course of a week.

Fig. 2.—Gummatus ulcer of border in a man, aged 25. The slough has not been completely removed.

Fig. 3.—Large cleft or fissure-like cavity produced by the breaking of gummata in the tongue of a man, aged 39 years. The cavity is represented as it appeared when its sides were separated by the fingers.

Plate IV.



Fig. 1



Fig. 2.



Fig. 3.

sufficient and fit food during the attacks. The same application of carbolic acid was ordered for her, with similar directions for its application, but she found it absolutely impossible to bear it. She was then ordered an ointment consisting of 4 or 5 grains of cocaine, 10 grains of boracic acid, 2 drachms of vaseline, and 6 drachms of lanolin. The tongue was dried before each application, and the ointment was then applied. A portion of it, like a little piece of butter, was placed upon the tongue, and was thoroughly rubbed in by pressing the tongue against the palate and inside of the cheeks and gums. This was carried out many times during the twenty-four hours, with such success that the attacks were speedily diminished in severity, and finally, at the end of several weeks, were completely cured. She had a slight relapse some months later, but a repetition of the treatment again speedily relieved her.

Herpetic ulcers of the tongue, formerly termed "aphthous," which are seen especially in children, are described in Chapter IX.

CHAPTER VIII.

CHRONIC SUPERFICIAL GLOSSITIS.

Leukokeratosis, Leukoplakia, or Leucoma of the Tongue ; Nomenclature ; Pathological Anatomy ; Clinical Description : (a) Smoker's Patch ; (b) Leukokeratosis or Leucoma ; (c) Ichthyosis ; (d) Smooth Tongue ; (e) Gouty and Rheumatic Patches ; (f) Patches on the Tongue with Skin Affections, Eczema, Psoriasis, Lichen, Lupus—Hyperkeratosis Linguae, Hairy Black Tongue, or Nigrities.

THE subjects dealt with in this chapter have also had a great number of names applied to them, of which some explanation must be given. The important characteristic of all is a disposition to change of form and to over-growth of the epidermis, which has become known under the term keratosis. It is this change in the epidermis upon which the chief interest centres, because, by further modifications of the process, the important sequela, epithelioma, ensues. This keratosis is distinguished into two forms :—

(1) An increase of the stratified epithelial corneous layers, with a tendency towards the disappearance of the normal papillæ, so that white, smooth patches are formed by various thicknesses of the corneous layers of the epidermis. This is the important process which, with manifestations of induration and ulceration, precedes the development of epithelioma.

(2) An overgrowth of the filiform papillæ, hyperkeratosis, so as to form hair-like filaments, consisting of epithelial scales, which generally become black, "the hairy or black tongue." This form is of great interest, but of little clinical importance, is temporary, and does not lead to cancer.

1. **Leukokeratosis, Leukoplakia, or Leucoma.**

The patches formed by chronic superficial glossitis are objectively white, and, anatomically, the process is one of keratosis or cornification. Hence, of all the names for this

disorder, leukokeratosis has the most significance. Leucoma, suggested by Hutchinson, though perhaps not scientifically so correct, has the advantage of being a short word, and was used in the last edition of this work. Leukoplakia, proposed by Schwimmer, and leucoplasia are in common use, signifying white patches, but do not carry so full a meaning as leukokeratosis. Psoriasis is also a word in very common use, but there is room for confusion, as there are three senses in which psoriasis of the tongue may be employed: (a) The strict sense, in which the affection of the tongue is present with simple psoriasis of the skin; this is a rare affection, but it does occur; (b) so-called syphilitic psoriasis, or scaly syphilide, in which there is a simultaneous affection of the tongue and of the skin; (c) the affection of the tongue, quite distinct, on the one hand, from simple psoriasis, on the other, having no connection with syphilis, caused, e.g. by smoking. Ichthyosis is the name given to the affection by Hulke; it is especially applicable to advanced stages of the affection, in which there are hard and warty areas. Tylosis is the name for callosity. It is now rarely applied to the tongue.

Filmy patches or opaline plaques are suitable clinical names for some of the less marked types. Boiled white of egg was the appearance to which Lawrence, in 1862, compared a patch on the tongue, which he first shaved off and upon its recurrence excised. He found that the material removed consisted only of thickened epidermis, and was not cancer. Hulke, in 1861, gave a microscopical description of the epithelial changes which produce the patch, and, later, showed the tendency of the disease to pass on to epithelioma.

Pathological Anatomy.—Sangster has given a good description, with drawings of the general changes, and Butlin has particularly described the anatomy of the smooth variety of chronic superficial glossitis. Recently more minute changes in the epithelial cells have been studied by Leloir, especially in relation to the epitheliomatous change. In the common forms the papillæ disappear, leaving a smooth patch, covered only with a thin layer of corneous epithelium, the layer being often thinner than the normal epithelium. The processes going on are a proliferation of the cells of the

Malpighian layer, with a collection of leucocytes immediately below the epithelium, a gradual shrinkage and disappearance of the papillæ, with the formation of some scar-like tissue immediately beneath the epidermis. At first sight, one might suppose oneself looking at a section from the mucous membrane on the under surface of the tongue, where there are normally no papillæ. Yet this section from the dorsum differs from the normal mucous membrane of the under surface by having scar-like tissue immediately beneath the epidermis, and there are fine granular changes in the epithelial cells which are not seen under normal conditions. In other words, the patch appears to be scar-tissue covered by a thin layer of epidermis.

The less common form is concerned, like the other, with a disappearance of the papillæ, the collection of leucocytes below the epidermis, and the formation of scar-tissue there. (Fig. 8.) But, in addition, there is an increased thickness of the corneous layers of the epidermis, until, in this special respect, the section may come to have an appearance resembling a section of the skin of the palm.

The amount of leucocytes and of new-formed fibrous tissue beneath the epidermis varies with the amount of inflammation which has taken place. In this respect, an actively inflamed patch will differ from one which has existed quietly for years.

Recently much attention has been paid to minute changes taking place chiefly in the layers of cells immediately above the Malpighian layer. The cells of the granular layers become vacuolated and show granules of eleidine. This is a change similar to that which is seen so abundantly in the cells of epithelioma. It is looked upon as a degenerative process, a dekeratinisation, as the stage immediately preceding the time when the epithelial cells, ceasing to grow upwards, will, as it were, turn about and form downgrowths of epithelium, which mark the beginning of cancer.

(a) *Smoker's Patch*.—Under this name is understood an altered condition of the epithelium of the dorsum of the tongue, due to smoking. In the most typical instances it appears about the middle of the front part of the dorsum, but on one side of the middle line, just where the end of the

tobacco-pipe rests, or where the stream of smoke from the pipe or cigar impinges on the surface of the tongue. At this point there is noticed a patch or slightly raised area, generally of oval shape, and at first of very small size, not more than



Fig. 8.—CHRONIC SUPERFICIAL GLOSSITIS.

Photographed from a section through a patch (see Pl. V., Fig. 1) on the excised portion of the tongue of a woman aged 37, who had been seen by de Havilland Hall and Butlin four years before.

Epithelioma commenced at some distance from the place from which the above section was taken, and the diseased portion was excised by Spencer. The patient is living twelve years after the operation with the rest of the tongue sound. She had not smoked, nor was there evidence of syphilis. She had suffered from dyspepsia, was fond of spices and hot drinks, and shortly after the excision had a bad attack of gastric ulceration with haematemesis.

The photograph shows below the epithelium scar-tissue with collections of leucocytes, the papillæ are irregular, the epidermis is much increased in thickness, especially the corneous layers, the lower layers of the latter appear as a light band owing to the cells being vacuolated and filled with eleidin granules. The cells above the Malpighian layer show the same changes to a less extent.

Although the papillæ are irregular, there is in the specimen no definite downgrowth of epithelium.

a quarter to half an inch long, and about half as broad as it is long. The surface of the patch may exhibit a perfectly smooth red or livid aspect, not ulcerated, or even excoriated, but looking merely as if the papillæ had been removed. It is not obviously swollen, but rather appears depressed in the midst of the furred papillæ by which it is everywhere

surrounded. By-and-by it becomes covered with a layer of yellowish-white or yellowish-brown material in the form of a thin crust, which grows thicker, until at length it peels off or is removed, and the red smooth spot is again exposed.

In other cases, instead of a red or crusted patch, there appears a bluish-white or pearly patch, without any surrounding redness or sign of inflammation. It is, usually perfectly smooth, and quite as sharply defined as the red patch, and is very evident, unless the dorsum of the tongue in the immediate neighbourhood is covered with fur of the same tint. Even then the smoothness and pearly aspect of the patch distinguish it from the natural surface of the tongue.

The affected area is not always limited to the region of the dorsum near the middle line, but has a tendency to spread very slowly over the surface of the dorsum, until the whole of the upper surface in front of the circumvallate papillæ may be affected. The inside of the cheeks is liable to become similarly diseased, particularly along the line where the teeth meet, a circumstance which may be ascribed partly to the fact that the smoke reaches this part of the inside of the cheeks more directly than any other part, and that this line is more exposed to injury from the teeth than the higher and lower lines. The mucous membrane of the cheeks is so readily affected that it is often the seat of disease, when only a single small patch is apparent on the surface of the tongue. When the entire surface or large areas of the dorsum are affected, the disease ceases to be called "smoker's patch;" it is known by the names psoriasis, leucoma, leukoplakia, etc. The fully-developed disease will be considered in the next section, and only the limited affection to which the name "smoker's patch" is given will be discussed here.

The smoker's patch is not at all painful or tender, unless it has been irritated and made raw, and its presence is often only accidentally discovered. If the end of a pipe, especially if the pipe is made of clay, is allowed constantly to rest on it, it then not uncommonly is a little tender, and the slight tenderness draws the attention of the smoker to it.

The patch may remain in one of the conditions described

during very many months or years: indeed, we believe the bluish patch may remain, with little alteration, the same during many years, and the crusts may form on the red patch and peel off for years; but it is much more usual for the disease to spread over the surface of the tongue if the irritation is continued. On the other hand, the red patches may be quite restored to their normal condition, and possibly even that the bluish-white patches may undergo resolution, although that is far less probable.

Smoker's patch is apparently a patch of inflamed mucous membrane of the dorsum, produced by the irritation of the column of smoke impinging on it, or if produced by the contact of the stem of a tobacco-pipe, yet certainly maintained in great part by the irritation of the tobacco. The inflammation is so chronic, and the changes are so slow and, one may almost say, so trivial at first, and for a long time, that they excite no annoyance, and are not noticed until the condition has existed a considerable time. The consequence is that the disease, trivial as it is at first, has gained a tolerably firm footing, and slight thickening of the deeper layers of the epithelium and of the superficial layers of the cutis of the mucous membrane, not perceptible to touch, are already present when it is discovered. Even if the use of tobacco is abjured, or if care is taken to protect the affected spot from the impact of the smoke or the contact of the pipe-stem, the diseased area is not always resolved. It may remain with little alteration, or may extend over the surface of the tongue.

The *treatment* of the less extensive patches and of those in which the disease appears only to have been present for a little while (in which, for example, the area is still merely redder than natural, and smooth) consists in taking precautions to prevent the pipe-stem or column of smoke from directly touching the affected spot; it is not necessary to forbid smoking, but if the patient is an inveterate smoker, the amount of tobacco and the form in which it is smoked may be advantageously altered. He should be restricted to fewer cigars or pipes, and the pipe he smokes should not be very short, and its stem, particularly that part of it which is held within the mouth, should be very smooth, and made

of the least irritating material possible. He should certainly hold his pipe or cigar in the side of the mouth opposite to that on which is the affected area. The patch may be painted occasionally with a solution of chromic acid, about five or ten grains to the ounce, or with a weak solution of tannic acid or alum, applied with a soft camel-hair brush.

If the disease is more extensive and appears to be extending on the tongue, or is present at several points on the tongue, and perhaps upon the inside of the cheeks as well, a more decided plan of treatment must be adopted. The patient must be urged to forbear smoking, not only on account of the disease actually present, but of the probability that, if the irritation is not removed, it will extend widely and become a serious mischief, the precursor, possibly, of much more grave trouble. If the patient refuses to obey the order not to smoke, he must at least be considerably restricted in the use of tobacco. In addition, every precaution must be taken, by careful attention to diet, to prevent the surface of the tongue from being irritated by too sweet, too sharp, or sour, or strong foods and drinks. Spirit, unless largely diluted, is decidedly prejudicial, and strong wines, like sherry and port, are injurious. The tongue should be painted three or four times in the day with a solution of chromic acid or with borax and honey, or with a weak astringent. Chlorate of potash lozenges or tablets are used. The bowels must be gently opened once every day, and if the general health is not good, and the patient comes of a gouty or rheumatic family, or if he has had syphilis, the constitutional treatment must be directed to the bettering of his condition. It may seem almost ridiculous to enforce or recommend so many rules for the relief of so trivial an affection, but there is ample reason for the exercise of every possible care in the early stages of the disease. If it is curable, it is only in the earlier stages; and if it extends so as to cover a large area of the tongue, it becomes a source of serious annoyance to the patient, which, from the difficulty or impossibility of curing it, lasts his whole life through; and it may, if neglected, be a strong predisposing cause of cancer. Patients who are not disposed to deny themselves the

smallest luxury when the disease is in an early stage, are often forced in later life to live very careful lives, forswearing tobacco and stimulants, besides using every care in the kind and condition of the food they take. To avoid so much distress in later life, it is worth while to use self-denial for weeks or months when the disease is just commencing.

The two following cases are admirable illustrations of two varieties of smoker's patch, one from the practice of Sir James Paget, who very kindly permitted us to use his manuscript notes of it.

Cases.—A gentleman, fifty-four years of age, consulted Mr. Butlin on account of two tiny patches on the dorsum of his tongue. One of them was in the front part of the median furrow, and could not be seen without separating the sides of the furrow, which was rather deeper than usual. The other was situated about half an inch to the right of the furrow, and not far from the tip of the tongue. It was about three-quarters of an inch long, by a quarter of an inch in its broadest part. Both patches presented precisely similar characters; they appeared to be mere alterations in the superficial layers of the mucous membrane, and were neither raised above nor depressed below the level of the healthy surface. They were bluish-white, opalescent, and slightly papillated or warty on the surface, and were as soft and pliable as the natural textures of the tongue. There were no signs of inflammation in or around them, and they were quite free from pain or discomfort, with the exception that occasionally they smarted a very little. The degree of discomfort attending them was so trivial that he had only noticed them by accident. On the mucous aspect of the cheeks, along the line where the teeth meet, were patches of the same nature, but differing slightly from them, in that they were whiter, rather more opaque, a little raised above the level of the surrounding membrane, and even softer than the patches on the tongue. It was impossible to say how long these patches on the cheeks and tongue had existed. They had been first noticed about six months previously, when he was at Malvern, and smoking rather more than usual.

He was at all other times rather a moderate than a great smoker, smoking three cigars and one pipe a day, but almost invariably on the right side of the mouth, in such a manner that the column of smoke directly struck that part of the dorsum on which was the larger of the two patches. During the previous week or two he had been applying some caustic to them, but it did not appear to have materially changed their aspect, for he said they looked precisely as they had done ever since they had first been discovered. It is worthy of note that this gentleman was a gouty subject, and had been several times under the care of Sir Dyce Duckworth on that account.

His disease appeared to be due to the irritation of smoke in a gouty subject, and the local treatment which was advised was to diminish his tobacco to one pipe and one cigar (smoked through a holder) daily, chlorate of potash lozenges, and a paint of about eight grains to the ounce of chromic acid.

Sir James Paget's case is quoted as nearly as possible in his own words. He says: "G. N., my pupil (this was in 1851), showed me near the middle of the dorsal surface of the tongue a diseased spot, which he ascribed to the frequent contact of the end of his tobacco-pipe. The spot was oval, about half by a quarter of an inch; nearly half was quite smooth, shining, pinkish-purple, looking not excoriated or as if ulcerated, but as if the papillæ were wasted and levelled down; it was exactly levelled and smooth. The rest was covered with a thick (third of a line), dirty, brownish-yellow layer, composed apparently of epithelium, like a fur on the tongue. No hardness or other change was perceptible, and the rest of the tongue appeared quite healthy."

"The disease had been observed about six months, in which time his description implied that the layer-like thick epithelium had often formed, and been spontaneously detached, and been again formed. It had given him no trouble, and he had continued to smoke daily once or more, and often repeatedly in the day, and always rested the end of his pipe on this spot. It was not a clay pipe."

"I told him he would certainly have cancer of the tongue if he went on smoking, and he promised to discontinue it."

(b) *Leucoma* may appear on the dorsum of the tongue in several, or even many, *different forms*, and these varieties are not necessarily directly connected with each other. They are not all of them different stages of the same form of disease, although they all, probably, own one common cause. Taking as examples the cases from which Mr. Godart made water-colour drawings, two very different conditions are evident, and of each of these two, two sub-conditions, or varieties, might be made. The first sketch represents a protruded tongue, the entire surface of which is deprived of its natural covering of papillæ, and which has no fur upon it, although a superficial observation might lead one to believe that it is entirely covered with thin fur; for, instead of its natural red colour, it has everywhere a bluish-white colour (Plate V., Fig. 3). But when the surface is carefully examined, the mucous membrane (or in any case its superficial layer) is found to have undergone a singular change. It is quite smooth, except where there are superficial furrows and markings on it, and is actually transformed into a thin bluish-white, or pearly, opalescent pellicle, which is in most places so thin or so translucent that the red colour of the tongue can be seen through it. It is not separable from the part on which it rests, at least, not without such scraping as will leave the subjacent surface raw and bleeding. It is quite soft and pliable, and in this respect seems to differ little, if at all, from the natural mucous membrane. Here and there the shallow furrows are very slightly sore, and look raw; but were it not for this, and for the wart which projects from one part of the dorsum, the patient would not be conscious that there was anything the matter with his tongue. So little annoyance has he suffered from it, that he can give no idea of the duration of the disease, and has only noticed that at intervals for a very long time past he has felt some trivial soreness of the surface of the tongue.

In this case the alteration of the mucous membrane extends over the entire surface of the protruded tongue, quite up to and over the borders; but in the case from which the second sketch is taken the disease is limited to the papillary area. The entire area is deprived of its papillæ, and is transformed into the same opalescent pellicle as in the last tongue,

but the tip and borders of the tongue are red and natural, or, maybe, somewhat too red to be quite natural (Plate VIII., Fig. 1). The leucoma is strictly limited, but it changes colour towards its border, becomes less blue and more opaque, and ends abruptly in a thick, opaque, dentated yellow margin. The appearance is as if the margin of the leucoma could be raised with small difficulty from off the red tongue beneath; but the appearance so far belies the truth that the raising would cause pain and bleeding, and would leave a raw surface behind. This patient knows that his tongue has been "wrong" for years, but he does not suffer much from it, and certainly would not have sought relief had it not been for the development of a warty growth upon the dorsum.

The third sketch presents a very different appearance. Occupying some three or four square inches of the middle of the papillary region of the dorsum is a dense white patch, with a very faint blue tinge perceptible in the white. It is slightly raised, especially in the centre, where it is thicker than at the sides; and here, too, it is whiter and more opaque. The whiteness and thickness diminish towards the borders of the plaque, and it ends abruptly on all sides in sharply defined, fringed, or deeply dentated margins. The contour of the front and sides of the patch correspond with the contour of the tip and border of the tongue, so that it is rounded in front; but at the back it is V-shaped, with the apex of the V directed forwards (Plate V., Fig. 1). The whole patch is mapped with shallow furrows, in which a dull blue or reddish tint appears; and the general aspect is that of a layer or dab of paint, which has hardened, dried, and cracked. It felt, both to the patient and surgeon, much drier and harder than the surrounding mucous membrane, which was natural, papillated, and covered with a very thin layer of fur.

The last of the four represents a condition which might well be regarded as a more advanced stage of the preceding. All the fore part of the tongue, from the very tip as far back as the teeth, is covered with a dense and opaque white coating, except at the borders and at three spots in the middle, where it looks as if it had been rubbed or scraped off. The coating has not the appearance of fur, for it is

denser, closer and firmer, and more compact. It looks much more like a double or treble coating of white paint, soiled and discoloured over a great part of its surface. Like the patch in the last case, it is furrowed, but its surface is not mapped with furrows, and the furrows are much finer and more delicate. The edges of the patch are very sharply defined and notched, as if the coating had been chipped away at the sides and at the central red spots (Plate V., Fig. 2). And, where the tongue is uncovered, it is unnaturally red and raw, and in parts excoriated and very sore. This patient suffered much more than the last, who, indeed, complained chiefly of the sense of dryness, the want of pliability, and of a continual thirst; whereas this man was in great distress on account of the soreness of the parts of the tongue which were uncovered by the coating. The destruction and removal of part of the leucoma, and the consequent exposure of the raw surface of the tongue, was probably accidental, due, perhaps, to an acute attack of inflammation on an old diseased tongue; but it appeared that such attacks were of common occurrence, and that his tongue was frequently very sore and troublesome.

As examples of much more limited leucoma, the tiny smoker's patches described in the last section may be taken, and between these and the conditions which have been just described every gradation may be observed. A single patch may increase in thickness and intensity of colour, and may develop crusts which peel off from time to time, and leave behind red, and perhaps raw places; or numerous thin bluish-white or pearly patches may form at many different points on the dorsum of the tongue, and, without coalescing or becoming thicker, may maintain their size and colour and appearance during long periods. Yellow leucomas are much more rare than blue or pearly patches, and when they do appear, are almost always yellow from the colouring of the patch by tobacco or some other extraneous substance.

The opportunity very rarely occurs of studying the earliest stages in the *development* of leucoma. Even the patient very seldom notices the actual commencement of the formation of the patches, and when they are shown to the doctor, they are usually decidedly leucomatous

patches, either white or bluish-white, or pearly. Schwimmer and Barker describe an earlier stage of dark red areas, or reddish patches. But we have not been able to confirm this observation. The extension of the disease appears to be also by the formation of bluish-white, and not red, patches. Patches of bluish-white appear in the neighbourhood of the original patch, or are formed on more distant parts of the dorsum of the tongue. They may, too, become smaller again or disappear; and are, therefore, not (what at one time we believed them to be) thin superficial scars resulting from the healing of inflamed or excoriated areas.

From what has been said of the relation of leucoma to smoker's patch, it will be evident that this disease may originate in the irritation produced by tobacco and tobacco smoke, but there is no evidence to prove that smoking is the sole *cause* of leucoma. Even those patches which are clearly due to the irritation of the pipe-stem or the column of smoke do not by any means invariably extend and form large areas of leucoma; while, on the other hand, leucoma is not very uncommon in persons who do not smoke and who never have smoked. Of other exciting causes, syphilis, acting locally upon the tongue, the frequent use of ardent spirits undiluted, the taking of very hot and highly-spiced meats or drinks, and the rubbing of rough carious teeth, or of tooth-plates composed of irritating material, may be held to be the most important.* Yet these causes, whether

* For some reason which I am not able to explain, red vulcanite appears to me to act as a very decided irritant and exciter of chronic superficial glossitis. I have seen quite a large number of instances in which the use of vulcanite plates has been followed by irritation and the formation of leucomatous areas, and these have been so distinctly localised along the line of the vulcanite that I could not doubt the connection between the tooth-plate and the disease. I have pointed this out to some of my dental friends, and have insisted that patients with delicate mucous membrane should wear gold instead of vulcanite. The change has been generally followed by improvement, provided the disease is not established. But the dental surgeons are by no means generally of my opinion. They have replied to me that they are constantly in the habit of employing vulcanite for tooth-plates, and that their patients do not suffer from chronic superficial glossitis. This negative evidence, however, does not in the least affect the question. Precisely similar evidence can be adduced against tobacco as an exciting cause of these varieties of glossitis; but the evidence in favour of the tobacco theory is decisive and of the same quality as that in favour of the

singly or combined, produce so little effect on the tongues of the large majority of persons who indulge in them, that Debove is certainly correct in believing that there is in most patients some predisposing cause. We suspect that the mucous membrane of the tongue in leucomatous subjects is from the first less thick and stable, more easily irritated than in the majority of persons. As some persons are known to have irritable and delicate skins, easily inflamed and prone to eruptions, and as some of these persons develop affections of the skin which are very chronic and difficult to heal, so other persons have tongues whose mucous membrane is abnormally delicate, prone to chronic inflammation, and difficult to cure when the disease has been excited. The reason for imagining the existence of such a predisposition is the facility with which leucoma is excited in some persons, and the difficulty, or almost impossibility, of exciting it in other persons. On the one hand, there are individuals suffering from leucoma who have never had syphilis, who have smoked little or not at all, who have never been in the habit of drinking spirits, unless largely diluted, who, nevertheless, from some slight casual irritation, or without any perceptible cause, suffer from leucoma, at first very slightly, but later much more severely. On the other hand, there are persons who habitually eat highly-seasoned food, women who day after day drink many cups of scalding tea, men who are never without a pipe or cigar or cigarette between their teeth, both men and women whose tongues have been again and again the seat of syphilitic lesions, and who show no signs of leucoma. The greatest smoker we have ever known, who smoked both pipes and cigars, had a perfectly natural tongue, except that it was a very little stained by the tobacco.

There are two other powerful predisposing causes of the affection: one age, the other sex. Leucoma is almost unknown in persons under twenty years; it appears rarely to vulcanite theory. Thousands of people smoke and chew, and wear vulcanite plates, and never suffer from superficial glossitis. But, in those who are predisposed to the disease, the use of tobacco and vulcanite plates is followed by the production of red and white areas just where the irritation is greatest and most constant; and the removal of the source of irritation is followed by marked improvement and cure, where cure is still possible.—*H. T. B.*

commence in those over sixty; and it rarely attacks women. On these points every author is agreed; and they seem to show that, even if there is a predisposition to the disease, it is rarely sufficient alone for its production. The exciting causes which have been mentioned are much more common in men than women, and in men than boys.*

As to the *frequency* of leucoma, there is a general impression that it is on the increase, but there are no facts to prove this. Medical men are much more alive to the importance which it may assume, are more ready to recognise it in its less aggravated conditions, and, therefore, record more cases and talk more about it than they did. It might almost be said never to have been recognised until a few years ago. The only facts at all approaching statistics are contained in the statement of Schwimmer, that he had examined 5,000 persons for leucoma in the course of nine years, and had discovered it only in twenty of them. But every one of the twenty cases was a genuine case of leucoma, or what he calls leukoplakia buccalis, for he did not include

* Formerly, I did not see any reason to associate the occurrence of leucoma or any of the forms of chronic superficial glossitis with gout and rheumatism. The experience of the last twelve years, however, has led me strongly to the belief that these diseases are very decided predisposing causes to chronic superficial glossitis. Not only is there a strong history of rheumatism or gout in many of the patients, but I have seen a number of cases of leucoma in quite young persons in whom it was impossible to discover any other cause than an inheritance of gout or rheumatism. The first case of this class, which puzzled me very much, was that of a tall, attractive young lady, about eighteen years of age, whom I saw in consultation with Mr. Marcus Allen. She had areas of thin leucoma of the inner aspect of both cheeks, but the tongue was very slightly affected. She was otherwise in splendid health; indeed, she might have been taken as a type of a fine healthy girl of eighteen years. There was no history or sign of specific disease, and the usual exciting causes of the affection were absent. The only cause I could discover was a history of slight rheumatism in the patient herself and in her family. Another young lady, three-and-twenty years of age, was sent to me for a similar condition of the tongue and inside of the cheeks, from which she had suffered for about a year. She did not smoke at all, not even an occasional cigarette, and there was not the least sign of syphilis. But she frequently suffered from little "gouty" troubles, and, as long as five years previously, had been pronounced by my colleague, Dr. Gee, to be suffering from gout. A course of treatment at Cauterets produced a considerable improvement in her condition. From these and several similar cases, I have come to regard gout and rheumatism as very strong factors in the production of the disease, probably almost the sole factor in most persons of either sex under twenty years of age.—H. T. B.

PLATE V.

Fig. 1.—Leucoma in a man, 41 years old, of about two years' duration.

Fig. 2.—Leucoma in a man, 34 years old, with abrasions and raw areas along the borders, due to an acute attack of inflammation in an old diseased tongue.

Fig. 3.—Leucoma covering the entire dorsum and borders of the tongue, with a little warty growth not yet become cancerous.



Fig. 1.



Fig. 2.



Fig. 3.

in his estimate small plaques due to irritation of various kinds, which from long observation were known to have remained unchanged in the lapse of years. Schwimmer's observations were made in Germany, and there are no statistics to show whether the disease is more or less common in other continental countries, and in what relation these countries stand to England and America.

In the larger number of instances leucoma affects the tongue alone; but it is not at all unusual to find that other parts of the interior of the mouth are similarly diseased. Above all other parts, the insides of the cheeks are likely to suffer, particularly along the line where the teeth meet; and next to the cheeks, the inside of the lips, especially the lower lip and near the corners of the mouth. The disease occurs sometimes, though rarely, on the gums and palate, and in one instance it has been discovered on the vulva.

In addition to the fact that it occurs on other parts of the inside of the mouth besides the tongue, it must be borne in mind that it has been observed in persons suffering from affections of the skin, not merely acute affections which might be regarded as accidental associations, but very chronic and obstinate eruptions, such as eczema, psoriasis, and ichthyosis. In these cases one might suppose that the mucous membrane of the tongue and the skin are both equally disposed to chronic and tedious affections, easily lighted up by comparatively trivial causes.

The *subjective symptoms* of leucoma are in most persons very slight, particularly when the disease is not very advanced, and when the coating is thin, and pliable, and soft. Often there are absolutely no symptoms, and the patient does not know that there is anything amiss until one day he perceives the patch or patches on his tongue. When his attention has been attracted to it, and especially if he has been told that leucoma may possibly be the precursor of carcinoma, he begins to experience some distress, but it is much more of mind than body. One patient said that usually he had no discomfort, and would not have been aware that his tongue was not perfectly natural; at times there was a slight sense of dryness and harshness, and

a very slight burning or smarting when he ate or drank hot food. In the more advanced stages, and when the leucoma is very thick, compact, and unyielding, a good deal of discomfort is experienced. The surface of the tongue feels always harder and drier than natural; the movements are not so readily and smoothly executed as they ought to be, and sometimes there is distressing thirst. There is not, as a rule, actual pain, even in eating, unless there is some accidental inflammation of the tongue, and salivation seldom occurs unless from the same cause. As to the effect of leucoma on the sense of taste, regarding which very different opinions have been expressed, the truth lies in this: that the taste is not at all noticeably impaired in the lighter cases of leucoma, but that a large area or great thickness and hardness of the coating decidedly impair the perfection of taste in those parts of the surface which are covered.

Of the *course* and possible *terminations* of leucoma, it must be said, first of all, that it is very doubtful, when the disease is actually confirmed, whether it is possible to cure it. Schwimmer is the only author who speaks confidently of the prospects of curing undoubted cases of leucoma, and he asserts that not only the red patches which he describes are capable of being cured, but that even well-marked white patches may be resolved. As, however, his remarks on therapeutics contain nothing new, not even a new suggestion for the use of old remedies, it can only be supposed, either that he has met with some very amenable instances of the disease, or that he has been mistaken in his diagnosis, or that he has followed up his cases for a much longer period than most other surgeons, and has certainly discovered that some of them recovered. Although we cannot say that we have ever observed the recovery of an undoubted instance of leucoma, where the disease was more than a small smoker's patch, yet we are not indisposed to believe that recovery is possible in certain cases; in cases, for example, in which the disease consists only of very thin and soft and pliable bluish-white patches. The fact that these patches vary from time to time in size and shape, and sometimes change their place upon the tongue, is strong presumptive

evidence that they are capable of being resolved. The certainty that they may form again over the parts from which they have disappeared is not opposed to the opinion that they may be cured, for the second development of the patch is probably due to a continuance or renewed occurrence of the cause which produced the first patch. Remove or prevent the cause, and the presumption is that the patches would not be re-formed. The course of the cases which do not recover has been, either to remain stationary, or nearly so, or to grow slowly worse. It is not unusual for the surface of the tongue to remain for many years so far in the same condition that the leucoma patches extend very, very slowly, and the disease gives rise to no inconvenience, and is scarcely, or not at all, noticed. The entire dorsal aspect of the tongue may become covered with the same kind of thin bluish or pearly layer as that which is described in the first of the sketches in this section (Pl. v., Fig. 1). In other cases the disease fluctuates : it breaks out in one place as it disappears from another ; the hope of a cure is continually excited, but the hope is seldom, if ever, fulfilled. In other cases, again, the leucoma, after remaining for a long time stationary, almost suddenly spreads quickly over the surface of the tongue. The manner in which such a case as this commences in the form of a single patch, remains stationary for a long time, perhaps many months, or even years, then suddenly spreads over the surface of the tongue, either continuously or in patches, more or less isolated, reminds one of the manner in which an eczema of the leg, due to some local cause, which has remained for a very long period quite stationary, sometimes suddenly spreads over the whole leg, and at the same time appears in other more or less distant parts of the body.

Again, the first formed patch may slowly increase in thickness and intensity of colour, and may, still more slowly, extend over the dorsum of the tongue, sometimes remaining stationary during a long period, then extending once more, perhaps with renewed vigour. When the entire surface of the tongue is covered, there may seem nothing left for the disease to do, unless, perhaps, to thicken and harden. Unfortunately, the coating is subject to accidents : it is easily irritated, and readily inflames ; or perhaps it would be more

correct to say that the surface of the tongue beneath the crust is irritated, and inflames. Portions of the crust die, and are cast off, and the raw bed on which they lie is exposed, and the exposed areas are extremely sore. Some persons are much more liable to these accidental attacks of inflammation than are others, either on account of some peculiarity in the leucoma, or because they are not so cautious in diet and in abstaining from whatever is likely to excite the tongue. Most of the troubles and real distress which patients with leucoma suffer is connected with these occasional inflammations, and the excoriations and ulcers which are associated with them.

These, however, are not the worst results of leucoma. A much more serious evil may arise, for the tongue may be attacked by cancer, and the leucoma is, undoubtedly, a very strong predisposing cause of the cancer. Attention has now for a long time past been called to the connection between the two diseases, and it may almost be thought that the possibility that carcinoma may be developed in connection with leucoma has been exaggerated, so much has been said and written of it lately. It was brought prominently under notice in Neligan's case. The disease commenced at the age of eighteen or nineteen, from the excessive use of a short pipe. At forty-six, the patient being otherwise in perfect health, a dense covering had spread over the whole tongue, and had extended to the sides of the cheeks and to the gums in contact with them; five years after being first seen he died of cancer of the tongue. But we believe that the frequency of the event, so far from having been exaggerated, has been underrated, and that careful records will show a much larger proportion of carcinomas which have been preceded by leucoma. The development of the carcinoma may take place in several different ways: either by the formation of a small lump, or a wart, or a sore. The lump and wart ulcerate, the sore deepens, and the ulcer, however formed, becomes surrounded by induration. Strange to say, it is not always, or even most often, the irritable and sore leucomas from which carcinoma is developed. An actual sore which forms in connection with one of these leucomas

may certainly become carcinomatous; but it as frequently happens that the leucomatous condition of the dorsum of the tongue has not excited marked attention until the formation is observed, which may be termed the initial lesion of the carcinoma. The series of histological changes by which the transformation of a limited area of a leucomatous or superficially inflamed tongue into carcinoma is accompanied is more fully referred to in the chapter on the pathology of epithelioma. It need only be said here that they consist in the ingrowing of the columns of epithelium, and that these columns soon contain in their interior epidermic globes (cell-nests).

Many different opinions have been expressed regarding the essential *nature* of leucoma. The views of Nedopil are, in the main, the views of most of those who hold that the disease is a chronic inflammatory affection; for, after describing the disease, he says that it is due to, and is long preceded by, a chronic inflammation of the mucous membrane. Without, therefore, further discussing the analogies of this disease with psoriasis, eczema, and other affections of the integument, it may suffice to say that it is regarded by most observers as the result of a long-continued and very mild inflammation of the mucous membrane of the tongue. This view accords with most of the phenomena which are observed in connection with it; the readiness with which it is excited by slight but long-continued irritation (in certain persons); the great differences which appear in its outward characters; the frequency with which it is associated with excoriations and ulcers; its slow progress, and resistance to treatment; and, last, the histology of the affected parts.

The one circumstance which appears to be opposed to the inflammatory theory is the white or bluish colour of the patches from the very commencement of the disease in the large majority of instances; but this may be explained by regarding the disease as essentially due to a chronic inflammation, commencing in the corium, immediately beneath the epidermis, and by supposing that the first changes in the epithelium are produced by alterations in its nutrition through the influence of the subjacent

affection, and that these changes are displayed in an alteration in the thickness, density, and transparency of the epithelial cells of those layers of the epidermis which are exposed by the shedding of the appendages of the papillæ.

The *diagnosis* of leucoma is not, in the large majority of instances, very difficult. The very chronic course of the disease, its occurrence only in adults (very rarely in women), and the character of the patches, serve to distinguish it from the diseases for which it is possible to mistake it. Thus the diagnosis from syphilitic mucous tubercles of the tongue rests on the much more rapid formation and spreading of the mucous tubercles, the fact that they are usually much more raised, and are plateaus rather than patches, on the difference of colour, the mucous patch being dead white or yellowish-white, while the leucoma almost invariably has a blue tint, unless it has been stained by tobacco. The more recent patches of leucoma are more translucent than the new-formed mucous tubercles. There is a greater difficulty in distinguishing between a mucous tubercle and a smoker's patch which is covered with a thicker crust than usual, especially when the crust, as is not uncommonly the case, presents a yellowish-white colour. The situation of the patch, the peeling off of the crust, the fact that it shows little or no tendency to extend, and the absence of associated signs of syphilis, especially on the dorsum of the tongue, are the points on which the diagnosis chiefly depends.

The scars of past syphilis, when they occur over a larger area of the surface than usual, and when they present a bluish tint, are sometimes mistaken for leucoma. In this case the diagnosis is not so easy, for, in fact, these marks really are leucomas, in so far as they are whitish patches; but they differ from the disease which we have been considering under this name in several important particulars. When once formed, they are stationary, occurring only where the syphilitic lesions formerly existed, and neither spreading nor altering their characters materially unless they are irritated or inflamed, and so break down again. They are also depressed, and they occur much more frequently upon the borders than the dorsum of the tongue. Of course, we are not now speaking of the scars of deep tertiary ulcers, but of

the thin, bluish, slightly depressed scars which result from the ulcers which so frequently form on or near the borders of the tongue in secondary syphilis.

Even aphthæ have been spoken of as an affection which may be mistaken for leucoma, but it is difficult to imagine how such a mistake can arise. One is essentially a disease of children, and is acute ; the other is a disease of adults, and is extremely chronic. The characters of the eruption in the two diseases are, too, so different that only a very imaginative person is likely to mistake one of them for the other.

After what has been said of the course and possible terminations of leucoma, it seems almost wholly unnecessary to devote a paragraph to the *prognosis* of the disease ; but a few words will not be amiss. In the first place, there is very small probability of the cure of any confirmed case, but the most likely cases for recovery are those in which the patches are not thick or raised, and in which they are soft and pliable, and alter their position on the dorsum. In the second place, the disease may remain almost in the same condition for years, or may spread extremely slowly over the surface of the tongue, and form a very thin continuous layer, which gives rise to scarcely any trouble, and is almost unnoticed by the patient. It is said that such conditions have existed for as long as forty or fifty years. Other patients will be liable to frequent attacks of inflammation, and will on this account require constant attention and treatment. And, lastly, carcinoma will develop in a certain proportion of cases, and the patient should be warned that the appearance of an ulcer that does not quickly heal, or of a hard lump, or of a wart or warty lump on the surface of the tongue, is in him a serious symptom, which should lead him to seek medical assistance without delay.

The *treatment* of leucoma is naturally almost entirely palliative, and the means of palliating may be divided into hygienic and medical. First, it is necessary to forbid smoking and chewing tobacco to those persons who suffer from the disease in its severer forms, or in whom the leucoma patches are spreading quickly, and threatening to become a serious annoyance. In the milder cases, the patient may continue to smoke, but not to chew, but the number of

pipes or cigars must be diminished, and he must smoke through the least irritating stems and holders, and on that side of his mouth on which the disease is least advanced. Then he should avoid spirits and the stronger wines, unless they are very largely diluted. With regard to diet, I believe that no better advice can be given than that he should not take anything very sweet or very sour, or very sharp or very strong. Extremely hot and extremely cold substances are alike injurious; and if he finds that certain articles of food cause smarting or tingling, he should eschew them.

Great care should be taken to remove any source of irritation, such as rough teeth or stumps, badly fitting and rough plates, and plates of vulcanite and other irritating objects.

Of constitutional treatment, none appears likely to be of general use; but if the patient has the signs of any decided constitutional malady, such as syphilis, or is subject to rheumatism, gout, or other similar affection, or comes of a family in which a certain diathesis is very prevalent, the constitutional treatment which is likely to correct his tendencies should be adopted. For patches of long standing, even if clearly syphilitic in origin, anti-syphilitic remedies are of little or no value. The lesion is the result of syphilis; not syphilitic, but post-syphilitic.

Although very little can be done in the majority of instances by constitutional treatment, much may be done by local means, if not to cure the disease, yet certainly to relieve it. In the lighter cases, the patient will probably do nothing more than wash the mouth occasionally with a solution or gargle. For this purpose he may use a solution of fifteen or twenty grains of bicarbonate of potash to an ounce of water, chlorate of potash, peroxide of hydrogen, listerine; or if he has suffered from syphilis, a weak solution of chromic acid (one or two grains to the ounce if used as a wash, five to ten grains if used as a paint), or a weak solution of bicyanide of mercury (one or two grains to the ounce). Salicylic and lactic acids have been used to remove the excess of epidermis. In more severe cases the tongue should be painted or washed frequently with such an alkaline wash as the solution of

bicarbonate of soda, or a similar solution of borax. A very weak solution of alum, two grains to the ounce, may be used, or a solution of chloride of sodium, about two grains to the ounce. Mel boracis suits some tongues better than the simple alkaline solution; and when the tongue is very sore as the result of passing inflammation, or is perhaps excoriated or ulcerated, mel boracis or a solution of chromic acid may be painted several times a day over the sore areas with the greatest benefit. As a general rule, alkaline solutions give greater relief in old-standing leucomas than any other solutions; but the solution which affords relief in most instances is not the best for all. Some tongues are much benefited by daily applications of Peru balsam or of non-irritating ointments of mercury.

For some years past I (Butlin) have been in the habit of largely employing ointments in the treatment of various affections of the tongue, particularly in cases of chronic superficial glossitis and leucoma. Solutions of all kinds are so quickly diluted by the liquids of the mouth, and are consequently so transient in their action that they do not do as much for the relief of the patient as they do upon the surface of the skin. Ointments, on the other hand, when properly applied, produce a much more lasting and beneficial effect. I first tried the effect on my own tongue of the ordinary cold cream supplied by a good chemist. If the tongue or roof of the mouth is burnt, a small piece of cold cream, like a little piece of butter, is placed upon the sore spot after it has been very gently dried with a clean pocket-handkerchief, and is thoroughly rubbed in by rubbing the tongue against the roof of the mouth. I quickly realised the relief afforded by this method of medication, and the rapidity with which the sore places were healed. The ointment appears to act in two ways—by protecting the surface of the tongue and by the ingredients which are mixed in with it. As a basis, the ordinary cold cream, which is made of white wax, cebaceum, oil of almonds, etc., serves very well. But a basis of somewhat greater consistence is often more useful. It may be attained by mixing two drachms of vaseline with six drachms of lanolin. Toilet lanolin is an exceedingly good basis, and may be used alone,

like cold cream. With one or other of these bases, borax, cocaine, eucalyptus, and many other drugs may be mixed, according to the needs of the individual case. The ointment should be thoroughly rubbed in night and morning, and, where more care is needed, several times during the day as well. The application at night should be made just before getting into bed, after the toilet has been completed. It is one of the most important applications, for it serves to protect the surface of the tongue during the night. Many of the patients who suffer from these chronic affections of the tongue are not only distressed, but are kept in trouble by the drying of the tongue during the night, and the cracking of it in the morning. This is much more likely to happen if the patient sleeps with the mouth open.

A little care and the trial of several different remedies will soon decide which of them is the most suitable to an individual case; and when the tongue is extremely sensitive, the changes must be rung until a solution which gives relief is found. One general rule holds good for all cases of leucoma, viz. *not to use caustics*. Whatever danger there may be of the development of carcinoma is certainly increased by the employment of nitrate of silver and other caustics, or the cautery.

Finally, the question may be raised whether leucoma of the tongue should be treated by excision of the patch. To this question the *general* reply must be, "Not in the early stages." The removal of a leucoma is followed by scarring, which is liable in such a tongue to give rise to as much trouble as the patch which was removed. And if the disease is extending, it is to be feared that the parts of the dorsum in the neighbourhood of the scar will be affected with leucoma just as if the primary patch had not been removed. But a patient is benefited by cutting out freely a very thick and circumscribed patch, especially when this is very obstinate, and scarcely at all relieved by treatment. When the disease has ceased extending, when no fresh patches have appeared for some time, when the patches have resisted all treatment and yet still show evidence of inflammation and induration, the case is different. Indurations, and warty growths, and very obstinate ulcers, particularly when they present the

slightest increase of induration about their bases, ought to be removed freely and without delay. They must be regarded as young cancers, and must be dealt with as if they were in truth cancers. The adoption of decided treatment on the first appearance of such threatenings of cancer would save the lives of a goodly number of those who now perish from cancer of the tongue. Ransohoff reports two cases without recurrence ten years after operation.

Scraping is of no service, recurrence is inevitable: the whole thickness of the epithelium must be cut out.

(c) *Ichthyosis*.—The condition which was first described by Mr. Hulke, in the "Transactions of the Clinical Society of London," under the name of ichthyosis of the tongue, differs from the patches of leucoma which have been described in certain of its characters. In the place of a white or bluish-white patch, there is an area of disease over which the papillæ are greatly hypertrophied: the surface of this part of the dorsum is warty, on account of the overgrowth of the papillæ, which, instead of preserving their natural consistence, are much harder than normal, and are sometimes quite horny. The diseased area may be very limited in extent, but several similar areas may be present on the same tongue. In the case which Mr. Hulke described there were at first two areas of disease, and the larger of the plaques gave the patient so much trouble when it grew very thick that he had been accustomed to shave it down with a razor from time to time. Mr. Hulke cut out the smaller of the two plaques, and the wound healed well and quickly. He described it after removal thus: "The wart is three lines thick at the centre and one and a half lines at the edge. It consists of the natural elements of the mucous membrane greatly hypertrophied. The papillæ and their epithelial sheaths are both involved." In the account of the structure of this and two other plaques, which were removed from the same tongue at a later period, Mr. Hulke says: "The excised plaques had essentially the same structure as that removed in 1861, viz. extreme hypertrophy of the filiform papillæ and their sheaths. These composite papillæ had an average diameter of '1 inch at their base, and the average length of '25 of an inch. The epithelial sheaths of the secondary papillæ, instead of ending

separately in brushes, cohered in solid masses, etc." The difference between this and the forms of leucoma described in the previous section is in the much more warty condition, owing to which Mr. Hulke thought fit to give it the name "ichthyosis" (*cf.* Papilloma, Fig. xxiv., Ch. XVI.). These warty conditions are much more rare than the other varieties of leucoma. Since the appearance of Hulke's paper, the term "ichthyosis" has often been applied to all the varieties of leucoma, whether they are warty or smooth, as synonymous with leucoma, leukoplakia, psoriasis, etc. It certainly is of the same nature as leucoma, for later investigation has shown that there is no essential difference in the minute anatomy of the diseases; that the ichthyotic patches are at their borders smooth, and in all respects similar to the patches of leucoma; and that the course of the diseases is in all respects the same, even to the tendency both show to develop carcinoma.

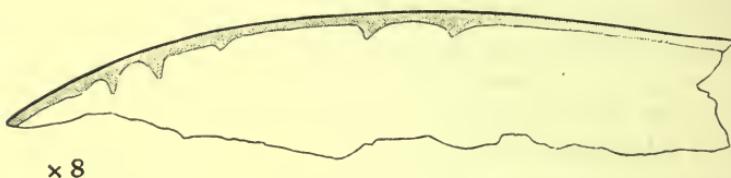
With regard to treatment, there is little to add to what was suggested in the last section. The question, however, thrusts itself more prominently forward, whether it would not be well to excise these very hard and warty patches before they attain a large size. Three of them were excised from the tongue of Mr. Hulke's patient; and although the wounds bled freely, they healed well, and left scars which were soft and free from disease long after the operations. The spread of the disease was from the patches which were left behind; and it may be argued that if the whole of every patch had been removed at an earlier stage of the disease, the patient might have been cured of ichthyosis, and have been saved from the later development of carcinoma, of which he died. The treatment by excision should be more largely employed in cases of limited leucoma and ichthyosis than it has been, especially when the tongue has upon it only a single patch.

(d) *The Smooth Tongue resulting from Chronic Superficial Glossitis.*—The whole, or a large area, of the dorsal aspect of the tongue is much smoother than natural: indeed, the papillæ have entirely disappeared (Fig. 9). The mucous membrane is redder, and not of the same uniform tint as in the natural state. It is uneven, too, and often presents smooth and elevated areas. Since there are no papillæ,

there is, of course, no fur. There are, not uncommonly, excoriations or superficial ulcers in the affected region; sometimes the entire tongue appears too large for the mouth, and its borders are marked by the pressure of the teeth; in other cases there is no evidence that it is increased in size. The surface looks glossy, and there are frequently thin, bluish-white patches on it. The subjective symptoms of this condition are often much more distressing, or, at least, annoying, than those of leucoma. Although there is no apparent alteration in the softness and pliancy of the tongue, it feels stiff and uncomfortable, perhaps because, as Clarke has said, the secretions of the mouth are more viscid and thicker than in the normal condition of the tongue. Movement is irksome, and much more discomfort is experienced in taking food than when the patient suffers either from leucoma or ichthyosis. All the various irritating kinds or conditions of food which have been indicated in the paragraph on the treatment of leucoma are infinitely more hurtful to these tongues. Spirits, especially, and smoke cause very great distress; so that the patients of their own free-will often abstain from the use of them, though they were largely addicted to them formerly. Indiscretions in diet quickly and certainly induce fresh inflammations of the dorsum of the tongue. Nor will this appear strange when the minute anatomy of the disease is studied. The epidermis is reduced to a thin, tolerably uniform layer, and consists of two parts, a horny and a mucous layer, the intermediate layer of larger, more translucent cells, such as exists in the normal tongue, being generally absent. The downward processes of epithelium between the papillæ are very much smaller than in the natural tongue, and the aspect of a perpendicular section rather resembles a perpendicular section of the skin. The corium is decidedly increased in thickness, more vascular than the normal corium, and is thickly infiltrated with round cells, like leucocytes. The extreme thinning of the epidermis, and the excited and excitable condition of the corium, to which the increased vascularity and cellular infiltration bear witness, thoroughly explain the readiness with which the mucous membrane is lighted up into repeated inflammations. Inflammable material is at

all times collected together in the parts immediately beneath the epidermis, and the epidermis is too thin to thoroughly protect the parts beneath from the exciting influence of many irritants, which, with a thicker and more perfect epidermis, would pass over it without producing any serious disturbance.

A comparison of the minute anatomy of this disease and of leucoma and ichthyosis shows that their essential characters are the same. In all there is thinning of the epidermis, except in the more typical instances of ichthyosis;



$\times 8$

Fig 9.—THE SMOOTH TONGUE RESULTING FROM CHRONIC SUPERFICIAL GLOSSITIS.

Reproduced from Butlin's "Sarcoma and Carcinoma," 1882—Plate III. Fig. 5.
pp. 130—31.

A section of a tongue, the seat of Chronic Superficial Glossitis, showing the thinning of the epidermis and absence of papillæ.

in all there is a well-marked horny layer of the epidermis, and all of them exhibit increase of thickness, vascularity, and cellular infiltration of the corium. The appearances are in each case those of inflammation of the mucous membrane of the tongue, and the difference which is observed in the outward appearance of the surface of the tongue in the different diseases must be attributed to the influence of some, probably imperceptible, difference in the chemical or physical structure of the affected membrane. Differences analogous in kind may be observed in the reaction to irritants and injuries of other parts of the body. Under the influence of a hot sun, the skin of one man browns, the skin of one of his companions reddens, and of another companion peels off. Two workers in sugar suffer from grocer's itch. In both of them the disease is, or soon becomes, chronic; but in one of them the eruption is dry and thin and scaly, in the other it is thick and scabby. Yet there was probably no perceptible difference in the

appearance of the skin of the hands of the two men before the occurrence of the eruption, and almost certainly no difference could have been detected by microscopical examination. Such examples might be multiplied almost without limit, but these two will suffice to show that there is not a sufficient reason to be found in the differences of outward appearance of these diseases of the tongue for separating them pathologically from one another. In all of them there are the signs of inflammation of the mucous membrane; and the only difference is in the effect of this inflammation on the surface of the membrane.

Treatment.—The liability to renewed attacks of acute or sub-acute inflammation, and the much greater sensibility of the surface of the tongue, render it necessary continually to apply remedies for the relief of temporary pain and tenderness and salivation. Much greater care in diet is obliged to be taken by those who suffer from this disease. The plan of treatment is the same as that recommended for leucoma. Of the local remedies which were mentioned, those which appear to relieve the patients more certainly and quickly than any others are solutions of chromic acid of about five grains to the ounce of water, or the ointments which have been described (page 137). It must be borne in mind that chronic superficial glossitis, like leucoma and ichthyosis, may be the precursor and predisposing cause of lingual carcinoma, and that warty growths, indurations, and indolent ulcers which become indurated are all to be regarded as in the highest degree suspicious, and to be treated on the assumption that they are cancerous if they do not quickly yield to simple treatment.

(e) There are other but rarer causes of leukokeratosis, by which benign patches are produced on the tongue.

Patches of a benign nature occasionally accompanying general skin affections of a similar nature.—Leukokeratosis of the tongue, with keratosis of the skin and seborrhæic eczema. Morrow describes the case of a sailor, aged twenty-one, over whose entire body, with the exception of the palms of the hands, the soles of the feet and the face, the sebaceous follicles were filled with hard comedo-like bodies, from which white hairs projected. The tongue was large, rough, and

deeply-fissured, covered with whitish patches, and sore. The buccal mucous membrane was bluish-white, and raised in places into distinct plaques. The disease, including the soreness of the tongue, had existed as long as he could remember.

In Church's case, the left half of a girl's tongue was ichthyotic, also the inside of the left cheek and soft palate were the seat of papilliform outgrowths. A similar condition, due to the hypertrophy of papillæ, existed in patches on the skin of the neck, chest and axilla of the left side.

In Colleville's case a man, aged twenty, who did not smoke, and who showed no signs of syphilis, had whitish-grey plaques on the dorsum of the tongue. He had seborrhæic eczema on the scalp and face. The chief trouble with the tongue was neuralgic pain for an hour after meals.

Lichen of the Tongue.—In many cases of lichen planus, small patches or plaques occur on the tongue. Mr. Hutchinson has described several of these cases, calling them lichen-psoriasis, in which there were white patches on the tongue. They occurred generally on the lateral portions of the dorsum, and were at first punctate, but later, as is the case with the eruption on the skin, they became confluent. They were leucomata of a dirty white or French-white colour, usually a little raised above the level of the mucous membrane, like drops of size. In more than one case they occurred in the form of streaks as broad as the end of the finger, and one of the patients complained of soreness of the affected parts. There were almost invariably associated with them small punctate leucomata in the pouches of the cheeks.

If the patches occurred alone, there would be no means of distinguishing them from the more common patches of leucoma, but the diagnosis depends on the presence of the eruption of lichen planus. In so far as the leucomata of lichen planus are more amenable to treatment than the ordinary forms of leucoma, it is well, in making the diagnosis of a case of leucoma, to examine or inquire for eruptions on the skin. Usually, however, the cause of the patient's visit to a doctor is the skin eruption, not the affection of the tongue, for the latter produces very little, if any, inconvenience.

The affection of the tongue in lichen planus does not seem to be so obstinate or absolutely unyielding to treatment as the similar patches which have been described under the heading of leucoma. In those cases in which the results of treatment have been noted, the patches on the tongue have usually disappeared at or about the same time as the eruption on the body.

The *treatment* is such treatment as is good for the cure of the eruption on the skin. Above all things, arsenic appears to be beneficial. Under its influence the patches on the tongue slowly disappear. Seeing this effect of arsenic on the leucomata in association with lichen, one wonders why arsenic appears so ineffectual in cases of simple leucoma.

Leucomata of the tongue are described by Mr. Hutchinson in a case of pityriasis rubra (exfoliative dermatitis) under the care of Dr. Sparks, the notes of which were taken by Dr. Mitchell Bruce. This patient was quite cured of her skin eruption, but no statement is made of whether the tongue was cured or not.

Patches on the Tongue occurring with Simple Psoriasis of the Skin.—Cases of this rare condition are reported by Lacoarret and by Schütz. The two are part of the same affection. Lissauer found leukoplakia of the mouth and tongue in ten out of fifty cases of psoriasis vulgaris.

Leucoma and Tuberculosis.—In a young girl who exhibited the scars of healed lupus on the nose and palate, but who showed no evidences of syphilis, two patches formed underneath the tongue.

Thomson reports that a patient of his developed phthisis who had already smokers' patches on the tongue. Following this, tuberculous ulceration attacked these patches, as was proved by microscopical examination (*see also Butlin's Case, p. 182*).

2. The Hairy, Black Tongue (Nigrities—Hyperkeratosis Linguae).

This is a condition which has excited a great deal of interest, although its clinical importance is very slight. It is produced by an overgrowth of the epidermis of the filiform papillæ, but there is no production of true hairs.

The colour is often black, but it may be a sepia-brown, or yellow (Dinkler), or even blue (Mourek). The colour has nothing to do with the overgrowth of the papillæ, but is due to the organisms clinging to them.

The black patch is almost always noticed in the middle of the dorsum of the tongue, usually immediately in front of the V formed by the circumvallate papillæ; it is darkest at the centre, and fades towards the edge of the patch, where it becomes a light brown. In exceptional cases the situation is different. In Lediard's case (the specimen is in the Royal College of Surgeons' Museum, 2266A.) the patch was near the end of the tongue; in the case described by Curtis the patch had been noticed a week, and was situated behind the circumvallate papillæ. The discoloured area is at first of small size, but extends, as a rule, very slowly, until it covers a large portion of the dorsum of the tongue, lasting two or more weeks up to as many months. The affection disappears little by little from the circumference towards the centre, the colour fading to a brownish-yellow at the borders of the area, and the excess of epithelium separates by desquamation. The same series of phenomena may be repeated.

In some cases only the discoloration has been noticed, but generally the papillæ are enlarged and elongated, although it must not be forgotten that very large and long papillæ are the rule in the tongues of some persons as great smoothness is in the tongues of others. The same wide differences are noticed in the tongues of animals. Raynaud described a case in which the surface of the area looked like a field of corn laid by the wind and rain.

Sendziak saw a man in whom the papillæ appeared like bristly hairs, which he was accustomed to shave off, but they quickly grew again. He found that they consisted of very long filiform papillæ, composed of epithelial scales, in appearance like the stem of a plant covered with bracts. Goodale compared the elongation of the papillæ to feathers, with a central stem and lateral webs. It is in the interstices of the epithelial scales that organisms collect and give the colour, but there is no general agreement yet as to the organisms, or whether there is really only one. Ciaglinski

and Hewelke give in their paper a full account of a black mould which they cultivated from the spores obtained from a case of black tongue. They depict spherical capsules on the end of a stalk containing black spores. When the spore capsule burst, a mushroom-shaped columella was produced. Sendziak also cultivated this mould. But other observers do not confirm them. Goodale found the colour in his case to be due to highly refractile yellowish-brown granules, varying in size up to that of a red blood corpuscle. On the edge of the elongated papillæ were many cocci and bacilli. Eve showed a typical case at the Clinical Society, a patch about the size of a crown piece in front of the circumvallate papillæ. He only found fur organisms, staphylococci and leptostrix. Vollmer and others have considered that the colour is really due to a staining of the epithelial cells. On the whole, the colour, in the case of the black tongue, is really secondary to the formation of the elongated papillæ. Whoever is familiar with the various colours (some of them extremely brilliant) which are produced by the agency of micro-organisms cannot doubt the power of organisms on the surface of the tongue to produce the black or other colours, whether by the presence of colour bodies or by the production of a soluble stain colouring the epithelial cells.

Mr. Hutchinson, in his "Lectures," emphasised the possibility of the stain being produced by some chemical agent. The discolorations of the tongue have been alluded to, and intentional deception must be borne in mind in examining each individual case, especially if the patient be a hysterical girl.

But the question of colour is distinct from the origin of the hyperkeratosis. No explanation can be given as to the origin of this overgrowth of the papillæ except as regards the area on which it generally occurs. The dorsum of the tongue in front of the circumvallate papillæ is the least exposed to friction, and it is here, if anywhere, that fur tends to be present. But Curtis saw a patient in whom the growth occurred behind the circumvallate papillæ, a part especially free from fur. Within a few days the patient's mouth seemed to fill with long tendrils or lashes, like seaweed, with intense pain in the tongue and throat, and dysphagia. The growth

was cut off and the base scraped. The lashes removed had a blackish or brownish colour. Generally a black tongue causes no symptoms, and is discovered by chance. Vollmer's statement, that in half his cases the patients were syphilitic, is entirely opposed to all other accounts. The symptoms complained of, when the patient's attention has been attracted, are a mawkish taste and slight pain. In this respect the patient seen by Curtis was exceptional. The duration of the patch is very variable, but ultimately it tends to disappear spontaneously. Its persistence, however, brings no sequelæ. Lediard's patient suffered from cancer, for which the tongue was removed, but the dorsum of the tongue on which is the patch of elongated filiform papillæ, is quite free. The cancer commenced underneath the tongue. On the whole the best treatment is to take off the patient's attention by assuring him that the state of his tongue is a mere curiosity. Shaving and scraping have been often adopted, but the patch returns, to disappear later of its own accord. If some actual treatment is deemed necessary, then the patch may be painted with salicylic acid (2 per cent.), which has a well-known tendency to cause the desquamation of corneous epithelium; or, a solution of carbolic acid, 1 in 60, may be rubbed in with a clean piece of soft rag three or four times a day. Lactic acid is also used.

CHAPTER IX.

ON VARIOUS MORBID CONDITIONS.

Indentations—Excoriations—Furrows, Grooves, and Wrinkles—Fissures and Clefts
—Patches or Plaques—Nodes or Nodules—Ulcers—Abscess.

THERE are a number of clinical conditions met with on the tongue which are produced in various ways. Whilst a systematic description is given under each of the various causes, it is intended in this chapter to briefly review these conditions and refer the reader for the fuller description to other chapters.

1. Indentations.

Indentations of the borders of the tongue are not unusual as the result of the pressure of the teeth upon the tongue. When the tongue is temporarily swollen the border is marked all round by the pressure of the teeth, so as to present a festooned outline, and this disappears as soon as the tongue regains its natural size. It is, therefore, a matter of no importance as far as the alteration of the tongue is concerned, but may be a matter of importance in so far as it denotes that the tongue is swollen.

In mercurial glossitis, when the tongue is much swollen and ulcerated, the borders are usually deeply indented, and each indentation may be the seat of a foul ulcer.

When the enlargement of the tongue is permanent the indentations also may be permanent. We have before us a drawing of the tongue of an old woman, which presents a singular appearance. The entire tongue is large, but not so much larger than natural that it would excite attention by its size. The borders are, nevertheless, indented to a marvellous degree; indeed, they are not so much indented as scalloped out at irregular intervals into deep cup-like

depressions, corresponding to the few large ill-shaped teeth which still remained to her. And on the dorsum near the right border are three deep pits in the dorsum itself, made by the resting on it of three of her upper teeth. It was not only that the enlarged tongue had been pressed against the teeth, but that the teeth had gradually, as it were, grown or turned inwards to meet the tongue, and had dug deep pits along its border. No doubt the depth and permanency of the depressions depended partly on many succeeding attacks of ulceration, for they were ulcerated when she was seen, and that was the reason which had brought her to the hospital (Plate I., Fig. 2). Even when the tongue is merely indented by the teeth, without being actually ulcerated, there is a marked tendency for syphilis and other lesions to show a preference for starting at such a spot.

These permanent indentations are, of course, not amenable to treatment, and the question of treatment only arises when they are ulcerated.

2. Excoriations.

When the superficial corneous layers of the epithelium are removed, a raw surface is exposed, which is covered only by the deepest layers of epithelium, so that the capillary loops in the papillæ are brought near the surface, giving a red punctate appearance, and it is easy to rub off the rest of the epithelium and cause bleeding. The excoriated surface is painful on account of the exposure of the nerve ends.

The common causes of an excoriated tongue are slight injuries and dyspepsia, which set up a slight degree of subacute and chronic superficial glossitis. The reader is therefore referred to Chapter VII., under the heading, "The Raw or Excoriated Tongue." The injuries producing an excoriation are generally slight burns and scalds from hot food or drinks, and this is referred to in Chapter III.

3. **Furrows, Grooves, and Wrinkles**, producing the furrowed or sulcated tongue, are in most cases the result of superficial glossitis of recent or old standing, and are described in Chapter VII. There is a doubt whether furrows and grooves of old standing are to be looked upon as congenital, and, if congenital, from what cause, or as due to some previous inflammation, *e.g.* inherited syphilis. In some

cases such a furrowed tongue indicates a slight stage of macroglossia, the tongue being too large for the mouth.

But there is no doubt that the most marked and recent instances of superficial glossitis producing furrows are kept up by smoking, drinking, and by the friction of carious teeth. Syphilis, inherited or acquired, is a prominent cause of the glossitis causing the furrowing, but the cases should not be hastily diagnosed as due to this without some confirmatory evidences. In older patients the glossitis may be connected sometimes, perhaps, with gout.

4. Fissures and Clefts.

It has been mentioned in the last section that some of the natural and inflammatory furrows of the dorsum are so deep that they deserve the name of fissures, or clefts, rather than of furrows.

Dental Fissures.—A fissure may be caused by the rubbing and deep indentation of a *rough and jagged tooth*. Then the fissure is situated at the border of the tongue, and is usually not very long, but may be both deep and starred, and may discharge foul matter. Usually there is inflammation around these dental fissures, and the base is often slightly raised and indurated, or may be swollen and sodden. The sides and bottom of the fissure are ulcerated; indeed, the condition may more correctly be described as a fissured ulcer than as an ulcerated fissure. The diagnosis of the character of the disease is usually easily made by noting the presence of the offending tooth, by the inflammation, the very slight induration, the sodden base, and the absence of other signs and history of syphilis. The treatment is to remove the jagged cause as speedily as possible, to use chlorate of potash gargles, borax and honey, and if stimulation is required, a solution of chromic acid, or of sulphate of copper, or chloride of zinc. Care should be taken not to irritate the sore place by caustics and other active treatment, for in persons who are over thirty years of age there is always the possibility that it may develop into carcinoma. The manner in which this change takes place, and the increasing intensity and depth of induration by which it is accompanied, are discussed at length under ulcers and in the chapter on cancer. In most cases in which these foul

fissures are produced by such a simple cause as a rough tooth, the removal of the tooth will resolve the question. If the fissure then heals quickly under the above applications, well and good. If it does not it should be excised without delay and examined microscopically.

Tuberculous fissures and syphilitic fissures are very important forms, and are described under their respective headings in Chapters X. and XI.

Cancerous Fissures.—Fissures may be connected with cancer in two ways. A fissure already existing, caused by a jagged tooth or by syphilis, may develop into an epithelioma, or a cancer may become fissured. The first form is a most important matter and is described in the chapter on cancer. The metamorphosis of a simple into a malignant fissure is marked in the first instance by its refusal to heal; secondly, by its increase, especially in depth; and thirdly, by the induration of its margins. These conditions are also seen in a tuberculous ulcer, but, as mentioned under that heading, there are other signs of tubercle, and the diagnosis is only completed by a microscopical examination.

The fissures of a cancer are often deep clefts running far down into the substance and filled with decomposing discharges and *débris* of food, from which an offensive odour emanates. They are important as throwing light upon the extent of the cancer, the danger of opening into blood vessels, as explaining the source of the pain and septic absorption from which the patient suffers, and of certain cases of septic pneumonia occurring before or immediately after operation (Chapter XVIII.).

5. Patches or Plaques.

These occur on the surface of the tongue, particularly on the dorsum, as marks and alterations in colour and consistence which often look as if they were distinct pieces of material which had been let in. They all come under the term patch or plaque, although they vary considerably in kind and origin. Hence the different patches are described in the various chapters as below—

Chapter III.—Traumatic patches, produced by *burns*, *scalds*, etc.

Chapter IV.—Bare patches, by detachments of *fur*, *discolorations*, *pigmentations*.

Chapter VI.—Membranous patches, due to *diphtheria*, etc., also those due to *thrush*.

Chapter VII.—*Erythematous* or *wandering rash*, *dyspeptic* and *herpetic* patches.

Chapter VIII.—Characteristic white, smooth, *leucomatous* patches, and *hairy black* patches.

Chapter X.—*Leprosy* patch.

Chapter XI.—*Syphilitic* patches, the commonest of all.

6. Nodes and Nodules.

Knobs and lumps have a very short history, generally speaking, as they tend to break down in the centre, forming more or less of an abscess, and the epithelial covering shortly gives way and an ulcer is formed.

Dental Nodes.—Generally the irritation of a sharp tooth causes at once a fissure or ulcer. But the rubbing of the tongue against a tooth, rough yet not sharp, may give rise to an indolent nodule on the border of the tongue opposite the tooth. During this stage it might possibly give rise to difficulties in diagnosis from a *gumma* or *tumour*.

Tuberculous nodes and nodules and "tuberculomas" are described in Chapter X.; also *leprosy nodes*.

Syphilitic nodes and gumma are dealt with in Chapter XI.

Actinomycotic nodules surround a foreign body composed of vegetable material. They are scarcely seen at all in this country, but have been met with in Germany and elsewhere, and are described in Chapter X.

Foreign bodies, fragments of teeth, etc., may give rise to nodes (see Chapter III.).

Cancerous nodes and nodules are dealt with in Chapter XVIII.

Those which form at the margin of the tongue are often due to the irritation of a tooth, those on the dorsum or under surface frequently appear on patches of superficial glossitis, which, from being smooth, become irregularly nodular. They show a slowly increasing extension and induration of the surrounding tissues, with a tendency to ulceration. It is very important that such nodules should be recognised and removed at the earliest possible moment.

7. Ulcers.—Weber says, quite truly, that, besides syphilitic, mercurial, and cancerous ulcers of the tongue, there is a great series of ulcers of other kinds. In truth, the tongue

is very prone to ulceration; nor is this to be wondered at when the soft structure of the mucous membrane is considered, and the many sources of irritation and injury to which it is subjected. Even the teeth, which surround it on all sides on which it is exposed to injury from external enemies, and which look (when they are sound, and white, and clean) like a handsome range of bodyguards set there on purpose to protect it, sometimes fail to fulfil their natural duty, and even close upon it and wound it deeply, or falling to decay, slowly wear and irritate its borders. The food and drink, which, passing continually over it, serve generally to cleanse its coat, if taken too hot, or strong, or too abundantly, produce inflammation, and, as a frequent result of inflammation, ulceration; or, passing into the stomach, appear thence to re-act upon the tongue, and cause it to inflame and ulcerate. We spoke just now of the soft and delicate structure of the mucous membrane as a predisposing cause of ulceration; and it is well to note that, with the exception of syphilitic gummatous ulcers, and, perhaps, of some or all of those which are tuberculous, all the ulcers of the tongue are *primarily* diseases of the mucous membrane. Even of cancerous ulcers this is true, for if they are not diseases of the superficial layers of the epithelium, the evidence which has been adduced is entirely in favour of their origin in the deeper layers. And for some kinds of ulcers, notably the cancerous, the very vascularity and activity of the membrane, which serves in health to preserve its integrity and to renew it speedily after slight injury, are among the chief causes of the rapid spread of the ulceration.

It is not easy to classify all the various ulcers of the tongue, but the best basis of classification is that which rests on the causes of the ulcers. There is, then, no difficulty in placing the cancerous, tuberculous, syphilitic, and mercurial ulcers. The difficulty arises when the many ulcers which are not due to one of these causes are to be arranged; the herpetic, for example, and the ulcers which are described by some authors as inflammatory, by others as catarrhal, by others as dyspeptic. Perhaps the safest way of dealing with the various ulcers which cannot certainly be ascribed to a

definite and clearly ascertainable cause will be to include them under the general name of "simple." Many of those which will be included under this head might, no doubt, fairly be classed as traumatic, inasmuch as they are due to slight injuries or irritation, but the injury or irritation cannot always be discovered or defined. The ulcers which are undoubtedly due to such injuries as the rubbing or bites of teeth will be considered under the term "traumatic." And although herpetic ulcers present many features which might justly lead one to include them among the simple ulcers, yet they present such special and distinctive features that it is better to class them separately as "herpetic" ulcers.

These remarks will suffice to introduce the study of the different varieties of ulcer.

Simple ulcers occur frequently upon the tongue. In some cases of *long-standing and inveterate chronic superficial glossitis*, where the surface of the tongue is almost everywhere void of papillæ, covered with a thin, bluish-white, pearly pellicle, which might form a continuous layer were it not broken up into numerous small areas by fine lines and fissures, simple ulcers not uncommonly occur. They tend to form in the centre of the tongue or of the diseased area, as if (what is not improbably the case) that part were more feeble and less capable than other parts of resisting evil influences. They form sometimes by the actual sloughing of a fragment of the surface in the course of an acute attack of inflammation in the seat of the old chronic inflammation or scar tissue; but oftentimes they are formed by a kind of melting away of the epithelium. The sore which is in either case produced soon ceases to present an active appearance, and settles down into a chronic ulcer, with a smooth, red, glazed surface, inactive callous edges, not inflamed or indurated, unless from the dragging of the surrounding tissues towards it in a fruitless attempt to heal (Plate II., Fig. 3). Its shape is irregular, triangular, or starred, or fissured at the borders. Although it is so chronic, it is often sensitive, and even very painful, especially on the taking of hot and spiced and irritating food. It is therefore a source of much trouble to the patient, even

the movements of the tongue producing distress in some instances. In the softer varieties of chronic superficial glossitis, in which the extreme smoothness and lissome character of the tongue is a more striking feature than the pearly or white pellicle, the ulcers which are very frequently observed are rather excoriations than true ulcers. The surface, especially at the tip and borders, looks red and raw, but the outlines of the raw patches are very difficult to define, and there is not any well-marked depression, as in an ulcer. In truth, only the epithelium has been removed, leaving the corium of the mucous membrane uncovered and extremely sensitive. Few of those persons who suffer from chronic superficial glossitis in any of its varied forms escape ulceration of the tongue from time to time; nor is this to be wondered at, for the thick layer of epithelium which preserves the surface of the natural tongue is, in almost all conditions of superficial glossitis, exchanged for a much thinner and less efficient layer, and the thick plaques which form on some of these tongues at intervals, or which habitually cover the dorsum of some of them, peel off at intervals, and in their peeling off leave raw and unprotected areas. The diagnosis of these ulcers is easy on account of their association with chronic superficial glossitis; but the treatment is beset with difficulties. Not but that most of the ulcers and abrasions can be healed over, but they are scarcely healed when they break out again, or similar sores form in other portions of the tongue. It is on account of this tendency to ulceration and abrasion that persons with tongues affected with glossitis are obliged to live carefully and, for the most part, very plainly, avoiding hot, strong, sour, sharp, or even very sweet foods, preferring soft, unirritating substances and drinks. Those who are very subject to ulcers should, too, avoid smoking, and, above all things, the chewing of tobacco. Spirits are always bad for chronic glossitis: indeed, some cases of chronic superficial glossitis are to be attributed chiefly to the drinking of raw spirits, and the condition is aggravated by the continuance of the habit.

For local remedies, it will be found that the same treatment is not suitable for every case. Thus, honey and

borax painted frequently on the surface of the tongue affords speedy relief to some persons, solutions of tannic acid and of alum to other persons, chlorate of potash gargle to others, and a solution of chromic acid (five to ten grains to the ounce), again, to others. The chromic acid is recommended by Sir James Paget especially for those patients whose glossitis is of rheumatic or gouty origin. It should be painted on the surface of the ulcers and the surrounding tongue with a soft brush ; it seems to deaden the sensibility if it does no more. Nitrate of silver, unless in very weak solutions, is seldom serviceable ; in truth, the free use of nitrate of silver to all kinds of ulcers of the tongue, which was at one time the universal custom, and which is still largely practised, cannot be too strongly deprecated. So far from being beneficial, it is calculated to do infinite harm in many cases, and is a sure means of inducing cancer in those ulcers which may be said to be predisposed to cancer, but which a milder and more appropriate local treatment might have cured. It is not possible to lay down absolute directions as to which remedy should be used in each individual case ; in practice the particular remedy which appears applicable to a certain tongue may suit it far less well than another remedy which *a priori* might have seemed unsuitable. We are, therefore, in the habit of employing first the remedy which seems most likely to be useful, the soothing remedies to the most irritable ulcers, the astringent to the chronic and less sensitive sores, and, if relief is not quickly afforded, of changing the local remedy until the desired effect is produced.

Occasionally a very chronic ulcer is met with in the centre of a large bluish-white or opaque-white plaque, which resists every treatment, whether local or general. It is absolutely callous ; like an old ulcer of the leg seated upon the bone, its surface is smooth and dry, the surrounding tissues appearing to be drawn in towards it. Such an ulcer gives one the impression that it might be cured if it were seated in some part of the body where it could be treated by first destroying its smooth surface and its callous edge, then planting it with grafts. But on the tongue it is, we believe, an incurable disease. Even

these ulcers may be rendered far less sensitive and more endurable by chromic acid or tannin or some other local remedy. It need scarcely be suggested that all obvious causes of irritation should be removed or lessened, that rough teeth should be taken out or smoothed down, that plates of artificial teeth should be as well-fitting and

smooth as possible, and that the mouth and teeth should be kept carefully and thoroughly cleansed. The constitutional treatment is guided partly by a recognition of the causes which produced the chronic glossitis, and partly by the condition of the ulcer itself. It does not follow that ulceration of a tongue which is the seat of chronic glossitis of syphilitic origin will be improved by iodide of potassium or mercury; indeed, iodide of potassium is sometimes decidedly baneful to such tongues. The salivation which is always present when they are ulcerated is apt to be increased by the iodide. In more than one case in which the affection of the tongue was associated with eczema of the palms or of other parts of the body we have used liquor arsenicalis with

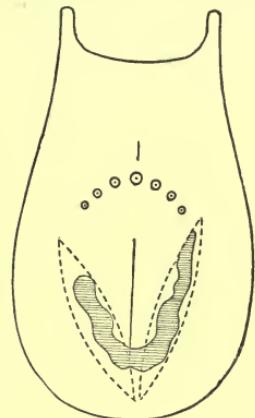


Fig. 10.—EXCISION OF A CHRONIC HORSESHOE-SHAPED ULCER ON THE DORSUM OF THE TONGUE.

(See Plate II., Fig. 3.)

Excision by four incisions, each two of which enclose an ellipse. The edges represented by the dotted lines were then united by suture.

advantage. But the chief reliance is, in almost every instance, to be placed on the local treatment.

This opinion is largely formed on the experience gained in the observation and treatment of the ulcer depicted on Plate II., Fig. 3, and of two other cases which were treated shortly afterwards. In 1885 the horse-shoe ulcer was painted with a strong solution of cocaine, scraped quite clean, the edges freshened, and powdered over with iodoform, which appeared to suit it better than any other local application. It became more active, and gave some promise of healing; but the promise was not kept. The little operation was repeated some weeks later, but with a

similar result. It was then cut out between elliptical incisions, disposed in the manner shown in the diagram (Fig. 10). The incisions were made deep into the substance of the tongue, so that not merely the surface, but a considerable depth of muscular tissue was removed. The bleeding vessels were tied with fine carbolised catgut, and the edges of each ellipse were brought together with silk sutures. Almost the entire wound healed by the first intention, and the patient left the hospital within a few days of the operation. When last seen, a year later, there was no ulceration of the tongue. In 1885 a smaller chronic ulcer of the left border of the tongue of a gentleman, who had suffered from it for several years, was treated in a similar manner, and with similar immediate result (Fig. 11). In October, 1888, nearly three years after, he was reported to be quite free from ulceration of the tongue. These cases formed the basis of a paper published in the St. Bartholomew's Hospital reports (Vol. XXIV., p. 83, 1888). Since that time many chronic ulcers have been removed in the same manner, varying the incisions in accordance with the requirements of the particular case. The essential of success is that the incisions should be carried deeply into the muscular substance of the tongue, so that there is no tension on the edges of the wound when they are brought together. As a rule, it is not necessary to ligature vessels. They may be twisted. If they threaten troublesome bleeding they should be tied with absorbable catgut. Silk appears to be the best material for sutures. They should be passed deeply, and should be removed not later than three or four days after the operation, lest their presence should lead to fresh ulceration.

The simple ulcers, which are described as *dyspeptic* or

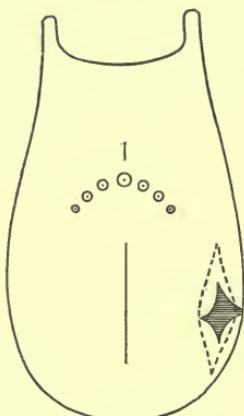


Fig. 11.—EXCISION OF A CHRONIC ULCER ON THE SIDE OF THE TONGUE, BY TWO INCISIONS ENCLOSED AN ELLIPSE, REPRESENTED BY DOTTED LINES.

catarrhal, occur chiefly on the tip, or on the dorsum near the tip, but may extend some distance back towards the centre. One of the commonest conditions is that in which the dorsum of the tongue, from the tip for a greater or less distance back, is very red, and almost raw. The filiform papillæ are absent, and, in consequence of this and of the general congestion of the superficial parts, the fungiform papillæ appear much larger and more prominent than natural. There are small superficial ulcers, without definite shape or characters, except that they are always red and irritable. Instead of ulcers, there may be only excoriations, and the whole of the diseased area may be quite raw, or the rawness may be limited to the central parts of the area (Plate I, Fig. 3). Behind the congested and ulcerated or excoriated area the surface of the tongue is furred, and the coating of fur is usually thick. There is not any general swelling of the organ, the disease being seemingly limited to the superficial parts. Although this condition is ascribed to dyspepsia, and is, in some instances, undoubtedly of dyspeptic origin, we have met with examples of it in persons in whom we could not discover any history or sign of dyspepsia. In some of these we have been inclined to attribute the condition to constant rubbing of the dorsum of the tongue against the roof of the mouth and teeth; in fact, to sucking of the tongue.

Small circular ulcers, which may also be described as dyspeptic, occur occasionally on the under surface of the tongue, on either side of the frenum. They, too, are superficial and punched out, with a golden or red surface. They are extremely sensitive, and occasion salivation. Weber thinks they are due to inflammation of the mucous follicles which are seated beneath the tongue, but we cannot find a sufficient reason for accepting his statement. These circular ulcers, whether of the dorsum or the under surface, are much more common in children than in adults; but they do occur in adults, especially in those who eat and drink heavily, and in invalids who are much enfeebled by disease. In children their dyspeptic origin is a matter of popular belief, and they are attributed by the nurses and those who have charge of the children to the eating of

PLATE VI.

Fig. 1.—Wandering rash in a boy, aged 9 years.

Fig. 2.—Mucous patches in secondary syphilis.

Fig. 3.—Mucous patches on the under aspect of the tip of the tongue in secondary syphilis.



Fig. 1.



Fig. 2



Fig. 3.

some food which has been forbidden or which is supposed to be unsuitable—unripe fruit, common sweetmeats, etc.

In the large majority of cases these dyspeptic ulcers and excoriations are not treated, and do not require treatment. A seidlitz powder or a dose of castor-oil, followed by care in diet, serves to allow them to recover in the course of a day or two, and, in worse cases, within a week. If they are more obstinate, or if they frequently recur, the patient must be regularly dieted: non-spiced and non-irritating food, not much meat, not much stimulant, but milk and other plain and simple food. The bowels should be kept open by the use of confection of senna or a dinner pill, or, for children, a little grey powder and rhubarb. The regular taking of medicine is rarely needful. But the distress arising from the presence of the most irritable sores may be greatly allayed by gargles of chlorate of potash or borax, in some cases by a weak solution of alum; and in children, by painting the sore places at intervals with a solution of chromic acid, or even by touching the most tender ulcers with nitrate of silver. The caustic is painful for the moment, but the application is followed by very quick relief.

Herpetic Ulcers.—The term “aphthous” was formerly often used, but, following the nomenclature adopted by the College of Physicians, the word aphthous is now synonymous with thrush. In this way the double use of the term, which has been the cause of so much confusion, is avoided.

Herpetic ulcers are met with both in children and in adults. They attack children between the ages of six months and three years, are less common after the end of the third year, and rare after the fifth year. Dr. West said they may be either concomitant with or a sequel of measles or other exanthem, or may be idiopathic. In the former case they depend on an extension to the mouth of a state of inflammation similar to that which gives rise to the eruption on the skin. The idiopathic form is generally preceded or attended by slight fever, with loss of appetite, and general malaise, and the evacuations are unhealthy. The child's mouth is hot, and there may be some salivation, especially in older children. If the child is suckled, it sucks with evident discomfort. The breath is almost invariably foetid.

If the mouth is examined, the mucous membrane is livid or deep red, and on the surface of the tongue, especially near the tip, a few small vesicles may be observed. But the disease is not limited to the tongue; the inside of the lips, the inside of the cheeks near the angles of the mouth, and sometimes other parts, are the seat of similar vesicles. The vesicles soon burst, and leave behind them ulcers, small, round, or oval, superficial, with sharp-cut edges, with a yellowish-white adherent slough upon them, and with a bright red areola surrounding them. The crop of vesicles varies in number, but there are rarely more than twenty. Usually the ulcers rapidly heal, the tongue regains its natural appearance, and the patient is soon quite well; but it not uncommonly happens that the first crop of vesicles is followed in a few days by a second crop, and the second by a third crop, and in this manner the malady may be prolonged during many days or weeks. This is the reason why vesicles and ulcers are sometimes observed in the mouth of the same patient; the vesicles are those belonging to a fresh eruption; the ulcers are the result of a former crop of vesicles. If the course of the individual ulcers is observed, it will be noticed that the little curd-like slough on each remains for a long time adherent, and can only be detached with pain and slight bleeding, while the area around the ulcer remains very red. In the course of three or more days the slough separates, and a shallow ulcer or excoriation is left, which speedily heals, and leaves behind neither permanent stain nor scar.

The symptoms which have been mentioned, the malaise, the foetor of the breath, and the successive crops of vesicles and ulcers, render the *diagnosis* of herpetic ulcers very easy. And the characters of the ulcers themselves are so striking that there is little fear that this disease will be mistaken for any other. The curd-like slough, the small circular sores, and the bright red areola surrounding them, are peculiar to herpetic ulceration.

In many cases of herpetic ulceration no medical *treatment* is called for. A dose of opening medicine is given by the mother or nurse, the mouth is washed with water, and the patient recovers in a few days. But in the majority

of instances the patient is ill, and the tongue is very sore, therefore medical aid is sought. The bowels must be cleared by a dose of castor-oil or a small quantity of rhubarb powder mixed with carbonate of soda; or, better still, sulphate of magnesia may be given in a mixture, thus: two drachms of sulphate of magnesia, one drachm of tincture of orange-peel, and six drachms of water; a fourth part to be taken every hour until a thorough action of the bowels is produced. The child must be put on very plain diet, without salt food or pastry of any kind, but consisting largely of milk, with one or two eggs. Chlorate of potash may be administered in doses of four or five grains every four hours, and the tongue may be wiped over, as Dr. West recommended, at frequent intervals with a soft piece of rag dipped in a lotion of borax. It is seldom necessary to use an astringent lotion unless the ulcers flag in healing; but they may then be treated with a weak lotion of alum or nitrate of silver, and syrup of the iodide of iron or some other preparation of iron, with cod-liver oil, may be ordered.

It is not advisable to administer mercury in any form to children suffering from ulceration, not even as a mercurial purge. The children are generally weakly, the ulceration is foul and unhealthy; and these are the very cases in which we may expect to meet with gangrenous stomatitis, the occurrence of which is often thought to be encouraged by the administration of mercury, although it has been given in very small doses.

This account of herpetic ulcers must not be closed without alluding to the possibility of contagion. We have, on more than one occasion, seen two or more children in a family attacked either simultaneously or after a short interval; and the question has naturally arisen whether the disease has in such cases been due to one common source, or whether one child has caught it of another. In the slight outbreaks we have seen the disease has occurred so nearly at the same time in the patients who were attacked that we have been disposed to attribute the epidemic to a common cause rather than to contagion. In one family of children it followed close on a debauch on

sweets, which seemed to have been as bad as they were plentiful.

The treatment of herpetic ulcers in adults is dealt with in the account of herpes of the tongue.

Traumatic Ulcers.—Ulceration may follow a wound, whether inflicted by a cutting instrument, a firearm, or by the teeth. No special description is needed of the sores which depend on wounds; their cause is evident, and their treatment will be guided by the general laws of the treatment of wounds, which are considered in the chapter on wounds of the tongue. But the ulcers which depend on the continued irritation or injury produced by *rough and carious teeth*, or by the chafing of a badly-fitting or rough plates of teeth, are so important on several accounts that they must be separately dealt with. They form almost invariably on the tip or borders of the tongue, and vary much in character, according to their date and the kind of irritation to which they have been subjected. They may be mere cracks or excoriations, or may be ulcers of half an inch to an inch in length, but they are seldom very deep, unless a ragged tooth has pressed directly into the affected part of the tongue where it is swollen and oedematous. The surface of the sore (for there is usually only one) and the borders are covered with a shreddy slough; the edges are sharp-cut and irregular, eaten out; the surrounding area is angry; and all the tissues of the tongue for some distance around and beneath the sore are swollen, sodden, or even indurated (Plate III., Fig. 1). The swelling of the subjacent tissues may cause the ulcer to be upraised to a considerable extent. The dorsum of the tongue at a little distance from the ulcer—in fact, beyond the swollen area—is thickly coated, and the breath and the ulcer, too, often smell badly. In more chronic cases the induration may be more marked, but the swelling around the sore is less, the edges are not so sharply cut, the surface is not sloughy, and the surrounding area is not so red and angry. The whole disease is more defined and much more difficult to diagnose. The thickening and induration is, in some instances, so marked a feature of the affection, and the ulceration is so inconsiderable, that

Demarquay has described it under the name of deep chronic glossitis. Paget has pointed out that the formation of these ulcers depends largely on the condition of the general health, and says that as long as the health is good the tongue may tolerate without damage the irritation of decayed and rough teeth; and this, no doubt, is largely true of the more active and ill-looking of the traumatic ulcers, but the more chronic and indolent thickenings and ulcers do not depend so much on the condition of the patient's health.

The *diagnosis* of these traumatic ulcers is often a matter of extreme difficulty. The active ulcers are liable to be mistaken for syphilitic sores, the indolent forms for tuberculous, or syphilitic, or cancerous ulcers. The rapid formation of the ulcer, the sudden condition of the surrounding parts, and the very small amount of real induration, together with its seat opposite a rough or carious tooth, and the absence of the signs of secondary or tertiary syphilis, should serve to distinguish the traumatic ulcer from almost any variety of syphilitic sore. The condition of the teeth and the relation of bad teeth or plates to the position of the ulcer are points to be carefully looked to. The diagnosis of the chronic forms of traumatic ulcer is infinitely more difficult. They have to be distinguished from primary syphilitic sores, and this may be done by the much greater hardness and circumscription of the initial lesion of syphilis, the almost invariable seat on the border near the tip, and the enlargement of the lymphatic glands, which is rarely present in association with a traumatic ulcer, unless it is very acute and angry. While, too, traumatic ulcers are of frequent occurrence, initial sores of syphilis are extremely rare. Nevertheless, the possibility of their occurrence must not be overlooked. From a syphilitic gummatous ulcer a traumatic sore may be distinguished by the much larger lump and induration usually seen in gummata; by the deeper ulceration and the foul surface of gummatous ulcers; by the presence, in many instances, of more than a single gumma; and by the associated signs of past or present syphilis, either on the tongue or elsewhere upon the body.

The diagnosis between a traumatic and a tuberculous ulcer depends on the greater depth of ulceration; on the lack

of induration in many instances ; on the presence of tubercles in the surrounding structures of the tongue. Primary tuberculous ulcers of the tongue are very rare, so that there are almost always other signs of tubercle in the lungs, the larynx, or in some more distant region of the body. Nor should the family history, which may throw much light on the disease, be overlooked.

Most difficult of all is the diagnosis from carcinoma, and the difficulty is not at all diminished by the fact that it is not unusual for a carcinoma to take its origin in a traumatic sore, so that a time may come when the sore is neither wholly cancerous nor wholly traumatic. The induration at its base may be actually due to ingrowth of the epithelium, but the epithelial ingrowth is not yet so strong as to stamp itself on all the deeper tissues, and appropriate treatment may yet succeed in averting the calamity. The diagnosis may be largely affected by the age of the patient, for a traumatic ulcer may occur at any age, while the occurrence of cancer is almost unknown in persons under thirty ; but inasmuch as the causes which generally produce chronic traumatic ulcers are much more common and more potent in adults than in children, so traumatic ulcers are far more common in adults, and in old adults than in young adults, so that this aid to diagnosis is seldom available. In the earlier stages of the disease the traumatic ulcer may be distinguished by the visible cause which has produced it, and by the less induration which surrounds it. It is in these cases especially that we regard the examination of a fragment of the margin of the ulcer with the microscope as very useful. (See page 342.) As the disease advances, the characters of carcinoma become more apparent in the increasing induration, the gradual extension and deepening of the ulcer, which is out of all proportion to the kind and amount of irritation, and the enlargement of the glands beneath the jaw. But the diagnosis may be certainly made, in the very large majority of cases, long before the glands are affected by the examination of a section. Amongst other signs, it must be borne in mind that carcinoma of the tongue is much more common in men than women.

The *prognosis* and *treatment* of traumatic ulcers are, for

the very large majority of instances, very happy. For, although it is not unusual for carcinoma to be preceded by traumatic ulcer, it is nevertheless possible to cure nearly all traumatic ulcers if they are properly treated. The source of irritation must be as quickly as possible removed: rough teeth smoothed down, carious teeth taken out, ill-fitting and roughly made plates altered or dispensed with. These precautions, which are desirable in every case, are doubly desirable or necessary in the cases of persons over forty years years of age, for in them the possibility of carcinoma is many times greater than in persons under forty. If there are very cogent reasons against the removal of a carious tooth, the tongue must be protected from it by covering the tooth with a thin plate of smooth vulcanite or celluloid. The removal of the irritation is, in many instances, sufficient for the cure of the disease, but it is desirable to supplement it by ordering the patient to frequently paint the surface of the sore with a solution of chromic acid (ten grains to one ounce of water) or with a lotion of borax one part, glycerine six parts, diluted with water, four to eight times. If the ulcer is unhealthy and sloughy, the tongue thickly coated, and the breath unwholesome, the bowels should be freely opened, a chlorate of potash gargle used at frequent intervals, and the patient put on tonic medicines and a liberal diet. In chronic cases, if the diagnosis between carcinoma and traumatic ulcer is very doubtful, and the ulcer does not quickly mend after the removal of the source of irritation and the use of other simple measures, the best course is to remove the disease, and with it an area of at least half an inch of healthy tissues. These are the cases in which it is possible, by a timely operation, neither large, nor dangerous, nor seriously lessening the utility of the tongue, to avert one of the most terrible and deadly of cancerous diseases.

Ulcers in Whooping-Cough; Ulcers on the Frænum from Coughing.—It is stated in some works and articles on whooping-cough that it is not unusual to find ulcers in the mouth at some time during the course of the disease; but certain of the French authors have drawn attention to the frequent occurrence in children with whooping-cough of ulcers underneath the tongue, in the immediate neighbour-

hood of the frenum. These ulcers are described as oval, superficial, and of small size, with irregular borders and a covering of thin grey slough. Their origin and the relation they bear to whooping-cough have been discussed with much animation by the authors who have described them. They are said to be a specific lesion of whooping-cough; but they are really no more than an accident of the disease, actually due to the rubbing of the tongue against the teeth during the paroxysms of coughing. Herpetic ulcers of the tongue and other parts of the mouth are not unusual, either during the preliminary catarrhal stage or when the cough is thoroughly developed; and we believe that all the sores which have been described are traumatic or herpetic sores, and not especially connected with the whooping-cough.

Mercurial Ulcers.—Ulceration of the tongue from mercury is a rare event in these days, when so much care is taken in the administration of mercury; but it is occasionally seen in persons who are singularly sensitive to its effects, or when sufficient caution has not been exercised in taking it. It may occur, too, in workers in mercury or in persons who have been subjected to the action of the fumes of mercury. The actual ulcers are generally shallow and irregular in shape, surrounded by a red area, but sometimes they eat much more deeply into the substance of the tongue. In either case they are usually the result of sloughing, and the sloughs cover them for some time after their formation. But the ulceration is only a part of a general diseased condition of the mouth produced by mercury. The ulcers are not limited to the tongue, but affect the gums, the insides of the cheeks, and other parts. The tongue is swollen and sodden; the gums are swollen, spongy, and separated from the teeth; the teeth are loose and covered with pasty deposit; there is profuse salivation, and the breath is peculiarly foetid. These associated conditions make the diagnosis of mercurial ulcers very easy.

Recovery usually quickly follows the discontinuance of the mercury, but the cure may be expedited and the patient much relieved by the administration of chlorate of potash in ten-grain doses every four hours, and by the use of gargles of chlorate of potash or of Condy's fluid. At a later stage,

if the tongue remains still swollen and the ulcers are slow in healing, astringent gargles of sulphate of iron or nitrate of silver may be used; and throughout the treatment, tonics and nourishing food, with port wine, are almost always indicated.

Tuberculous ulcers are described in Chapter X., *syphilitic ulcers* in Chapter XI., and *carcinomatous ulcer* in Chapter XVIII.

8. Abscess of the Tongue.

Many affections of the tongue cause, or are complicated by, suppuration and abscess, as described in the following chapters, due, doubtless, in most cases, to the presence of *staphylococcus pyogenes* :—

Chapter II.—Injuries and foreign bodies.

Chapter V.—Acute parenchymatous glossitis.

Chapter VI.—Acute superficial glossitis.

Chapter X.—Tuberculous and actinomycotic nodules caseate.

Chapter XI.—Syphilitic nodules and gummata breakdown.

Chapter XII.—Ranulae and calculi in the various salivary glands cause suppuration.

Chapter XIII.—Cysts, dermoid, thyroid, etc., suppurate.

Chapter XIV.—Follicular abscesses occur in the lingual tonsil.

Chapter XVIII.—Cancerous tumours set up suppuration around and in neighbouring glands.

Exceptionally pyæmic abscesses have occurred in the tongue following smallpox, typhoid fever, etc. An abscess is therefore a terminal phenomenon, and its diagnosis follows largely from the previous course of the disease, which it complicates. It is difficult in the mouth, or, indeed, impossible to distinguish between fluctuation and elastic swelling, and the existence of the abscess may remain uncertain until it is punctured or incised.

CHAPTER X.

THE INFECTIVE AND PARASITIC DISEASES OF THE TONGUE.

Tuberculous Disease of the Tongue : (a) Pathology ; (b) Tuberculous Nodes and Nodules ; (c) Tuberculous Fissures ; (d) Tuberculous Papillomas ; (e) Tuberculous Ulcers : (i.) Lupous Ulcers ; (ii.) Tuberculous Ulcers—Leprosy of the Tongue—Actinomycosis of the Tongue—Animal Parasites : Guinea Worm ; Trichina.

1. **Tuberculous Disease of the Tongue.**

(a) *Pathology*.—Much attention has been paid to the subject of late years. At one time it almost appeared as if tuberculous ulcers of the tongue were considered as late complications of pulmonary phthisis, for which all special treatment was hopeless, and very little was said on the matter. Unfortunately, this gloomy view is partly true, but with better clinical observations and microscopical examinations, it is now clear that local tuberculous fissures, nodules, cold abscesses and ulcers are not uncommon, and if treated early and in a suitable manner, the otherwise inevitable extension of the disease is arrested and healing follows.

We are now able to use the word tuberculous to include also strumous and lupous ulcers.

It is clear that inoculation may take place from the lungs by the active bacilli found in the sputa. Where lupus exists on the face the disease is usually inoculated by contact. Beyond this, the information as to the actual infection is yet indefinite. The lupous form of ulcer is nearly always seen in girls and young women, whilst men of various ages form the greater proportion of the other cases. Even where the tuberculous ulcers occur late in the course of pulmonary phthisis, men are usually attacked. We can only conclude that careless feeding, smoking, and rough pipe-stems, either cause excoriations by burning or rubbing, or prolong the course

of ulcers due to carious teeth and syphilis. Thus there are more often in the mouths of men sores upon which the tubercle bacillus can settle, and upon which it will grow unless the tissues are too resistant.

Many observers have noted—and it may be accepted as a peculiar feature of tubercle of the tongue—that there is



Fig. 12.—TUBERCULOUS DISEASE OF THE TONGUE.

Photographed from a Microscopical Section taken from the side of a Tuberculous Fissure.

There is not a regular formation of tubercles, but an infiltration of the muscular substance by flattened epithelial (endothelial) cells. Where these have completely replaced the muscle fibres, a few irregularly scattered giant cells are seen, some of which show signs of commencing caseation.

an absence of the typical formation of tubercles, giant cells rarely occur and bacilli are scarce. In many instances the mass of tubercle is found on microscopic examination (Fig. 12) to consist of flattened epithelial or endothelial cells without any giant cell in the centre. Instead of forming a more or less spherical mass, there is a diffuse infiltration of the flattened epithelial cells, extending outwards amongst the muscle fibres. The small-celled infiltration surrounding a typical tubercle varies much; sometimes the chief mass consists of small cells which entirely obscure the flattened epithelial cells. It is then only by a considerable search

that a giant cell can be found by which the disease can be identified (Auché et Carrière). By means of the microscope it may therefore be difficult to distinguish a lesion due to tubercle from syphilis and actinomycosis. The finding of bacilli would aid, but, as a matter of fact, they have been rarely found except when the disease has been secondary to affection of the lungs, and when, therefore, the bacilli are present in the sputa. There remains in doubtful cases the inoculation of an excised piece into a guinea-pig. The infiltrating epithelial form of tubercle has often been mistaken for cancer. This has generally been done when only a scraping or a tiny fragment has been examined.

(b) *Tuberculous Nodes and Nodules.* — The earliest tubercles which have been seen have been yellowish, projecting, rounded points, from 1 to 4 mm. in diameter, too small to attract attention by themselves except in the very rare instances in which the tongue has been included in acute miliary tuberculosis. Such minute tubercles have been seen in the neighbourhood of an ulcer, and thus served to diagnose the nature of the ulcer. Tiny yellowish lumps, or nodules, are formed by the aggregation of tubercles, varying from a pin's point upwards to a pea. They are commonly seen on the sides or tip of the tongue. It is exceptional for them to pass on to the size of a bean or small nut without breaking down into an ulcer. Exceptionally the epithelial covering remains intact. It is then necessary to distinguish a "tuberculoma," as it has been called, from a syphilitic gumma. In favour of the diagnosis of tubercle will be the absence of signs of past syphilis, the failure of anti-syphilitic remedies, evidence of tubercle in the patient, lupous or glandular scars, tubercle bacilli in the sputa, if there is pulmonary phthisis. Poncelet describes an intra-lingual tumour—a "tuberculoma" appearing in a man, aged twenty-six—as a tumour the size of a nut covered by normal epithelium. The submaxillary lymphatic glands were enlarged, and the patient was said to have had a similar tumour removed three years before.

A woman, aged twenty-four, under the care of Stonham, had suffered from extensive lupous infiltration of the skin

of the neck and chest, mostly of the non-ulcerating type. A tumour had been growing for two months on the left side and tip of the tongue without causing pain. It reached the size of a marble with the epithelium still intact, then the contents began to ooze out. The tumour was completely excised by a **V**-shaped incision, and was found to be a tuberculous mass, which had casedated and broken down in the centre.

Free excision is the proper treatment for all such nodules before the nodule has broken down and its contents have escaped into the mouth and perhaps inoculated a fresh part of the tongue. The excision should, if possible, be **V**-shaped, and the wound united, with the object of obtaining primary union and avoiding the re-infection of an open ulcer.

(c) *Tuberculous Fissures*.—Special attention has likewise been drawn of late to the peculiarities of tuberculous fissures, which render it possible that they may be overlooked in the early stage, when the time for treatment is favourable.

The tuberculous fissures are generally short, occurring at the tip or sides of the tongue, often stellate or branched, and generally single. In these respects they differ from syphilitic ulcers. The fissures are really fissured ulcers without vascular granulation, but with an indurated margin ; indeed, they may be described as a nodule with a chink in it. The appearance of the chink is deceptive until its edges are drawn apart, and then it will be found that the depth of the fissure is much greater than a superficial examination might lead one to suppose. It proves to be really a deep fissured ulcer with overhanging edges. Such a fissure may extend into the muscular substance without any corresponding surface extension. The sides of the cleft are prone to caseate and break down, rapidly forming a foul and ragged surface, exposed when the sides of the fissure are retracted. Indeed, such fissures may be called tuberculous rhagades. The diagnosis will be aided by finding tubercle bacilli or other signs of tuberculous disease. As distinguished from syphilis, there will be the enlargement or tenderness of the submaxillary lymphatic glands, whilst anti-syphilitic remedies

will have no effect. From a cancerous ulcer a tuberculous fissure can only be distinguished by microscopic examination, but tuberculous fissure is much more likely if the patient is young and shows other evidences of tubercle.

The treatment in all cases should be excision. The value of excision of small indurated fissures has been repeatedly confirmed. In limited cases, therefore, the diagnosis of tubercle from epithelioma is unimportant. In a more extensive case, where the operation for epithelioma would be more extensive than for tubercle, a small portion must be removed for microscopic examination.

(d) *Tuberculous Papillomas*.—This is an exaggeration of the tuberculous fissure, in which the epithelial covering is raised into folds which are infiltrated by tubercles, and between each of the folds are fissures. Audry and Iversene saw an instance on the tongue occurring along with cerebellar tuberculosis. A woman, aged twenty-one, under Darier, had had extensive lupous ulceration of the face and neck, which commenced at the age of three years. There were two papillomatous patches on the tongue, with enlarged submaxillary lymphatic glands. Typical tubercles undergoing degeneration were found in the interpapillary folds.

(e) *Tuberculous Ulcers*: (i) *Lupous Ulcers*.—Provided the disease is limited in extent, the least serious, from a surgical point of view, are those which occur, chiefly in young girls and women, along with lupous ulceration of the skin.

The illustration (Plate III., Fig. 3) was taken from an advanced case in a patient admitted into St. Bartholomew's Hospital. She was a well-grown young woman, twenty-three years old, horribly disfigured by the disease. All the central parts of her face were the seat of thin scar-tissue, with here and there small ulcers still unhealed. Her nose was eaten away almost to the level of the face. The upper lip was shortened, and fixed firmly to the gum behind it, and the margins of the lip and gum were ulcerated. Thence the disease extended for the distance of about an inch over the hard palate. The lower lip was enlarged; it hung down, and its everted mucous membrane was largely destroyed by an unhealthy ulcer. The upper and the lower

lip had become attached together at the angles of the mouth in such a manner as to seriously diminish its size. When she opened it, it was perceived that the fore-part of the tongue was the seat of ulceration, precisely similar in its characters to that of the lips and palate. At first a thick crust covered a large part of the surface of the sore, but when this was removed, an uneven nodular surface was exposed, of a pink-red colour, masked at intervals by dried discharge. The edges were quite abrupt, very irregular, uneven, and sometimes undermined. There was no surrounding inflammation or redness or induration; but the dorsum of the tongue for a short distance beyond the ulcer was dotted with yellowish points and tiny patches. She could not protrude the tongue, because all the tip had been completely destroyed by the ulceration as far back as the fraenum, so that there was no tip to protrude.

Her voice was gruff, and as the gruffness was of some years' duration, but had been preceded by disease of the mouth, it was fair to assume that the larynx was affected in like manner by lupus, but it could not be seen.

In addition to the extensive disease of the face and mouth, she had lost her left thumb, and her hand was still bound up on account of lupous ulcers.

In spite of this, her general health was not bad. She might have been regarded as a delicate girl, but certainly did not give us the impression that her constitution had been, or was being, undermined by the disease. The appearance of her face was rendered even more singular than it otherwise would have been by the constant movement (nystagmus) of her curious orange eyes.

She gave a history of having been attacked by a severe cold six years previously. The running from her nose made her lip sore. Small spots formed, and soon spread on to the cheek on either side. Gradually the disease extended to the margin of the lip, and round the lip to the gum and palate. Then, about four years ago, so far as she could charge her memory, she began to touch the sore places with her tongue, on the tip of which pimples formed and broke, leaving behind them ulcers. But she was sure that her tongue had been also scratched by the loose teeth in

front before they were displaced by the ulceration of the jaw, so that she fully believed that the tongue had been inoculated from the lip and gum. Three years before her admission into the hospital a sore place had formed on the left elbow, whence it had slowly extended down the fore-arm to the hand, and had seemed finally to settle in the thumb, where the bone had become so diseased that she had been forced to have it amputated.

She was an only child; her father and mother were alive and well, and there was no family history of phthisis, scrofula, or any similar disease to that from which she suffered. Her own health had been good until the appearance of the lupus, and there was no history of tubercle or serofula in early life. She had one enlarged gland of small size below the jaw in the middle line.

Leloir records a remarkable case, demonstrating the connection of tuberculosis of the tongue with other lupous lesions. The patient was a girl, aged fifteen, and the disease had commenced in the pharynx at the age of eight. Lupus had attacked the nose, upper lip, gums, fauces; and tuberculous ulceration had spread from the pharynx to the larynx below. There was, in addition, tuberculous disease of the submaxillary, cervical, and subclavian lymphatic glands, with pulmonary tuberculosis and herpes zoster on the side of the lung attacked. The tongue was infiltrated by tubercles, so that its surface appeared granular or mammillated. They were of a bluish, glistening appearance, some hard, others soft, but none actually ulcerated; between the tubercles were deep furrows. The diagnosis was confirmed by removal of pieces from the various parts affected, which were partly inoculated into animals, partly used for microscopical examination.

(ii.) *Tuberculous Ulcers.*—A completely developed tuberculous ulcer, not too broken down and sloughy, presents most of the following characters: the surface is uneven, pale, and rather flabby, granulated, often covered with yellowish-grey viscid or coagulated mucus; the edges are sometimes sharp-cut, sometimes bevelled, seldom elevated, or everted, or undermined, not usually very red, but often redder than the surrounding tongue; there is very little surrounding in-

duration; indeed, there may be none;* the adjacent portions of the tongue are generally a little swollen, sometimes decidedly swollen and sodden; the outline of the ulcer has no characteristic shape, but the borders are often sinuous, and the shape is not unusually oval or ovoid or elongated. In the immediate neighbourhood of the ulcer, and perhaps extending for some distance beyond it, are sometimes observed tiny yellowish-grey points or patches or elevations, or, in the place of these, minute ulcers, which in time increase in size. The depth of the ulcer varies much; in the earlier stages it is superficial, but as the disease advances it may eat deeply into the substance of the tongue, and eating more deeply at one part than another, may present different depths at different parts. It is almost invariably painful in the later stages, and there is almost always salivation.

In this description some resemblance may be discovered to the tuberculous ulcers of other parts of the body; in the pale and flabby granulations, the sharp-cut or bevelled edges, the absence of surrounding inflammation and induration. Weber speaks of the caseous surface of a tuberculous ulcer of the tongue which he observed, and this is sometimes seen in other tuberculous ulcers, but it is by no means constant in any part.

Tuberculous ulcers of the tongue may *commence* in several different ways: by the breaking of a small blood bleb or vesicle, or by the formation of a tiny nodule or a little yellow point or patch, which gives way before it attains the size of a pea, or even half that size. And in not a few cases the ulcer forms as the direct result of some continued irritation or slight injury. The illustration (Plate III., Fig. 2) is taken from a woman who had a tuberculous ulcer on the tip of the tongue, which was attributed to the rubbing of the lower teeth in front, and the marks of the teeth can be plainly perceived through and beyond the area of the ulcer. Yet, although it was thus continually irritated,

* Although tuberculous ulcers are generally not indurated, I have seen several of them in which there was as marked induration as is found in very indurated cancerous ulcers. The diagnosis has, on this account, been peculiarly difficult.—H. T. B.

it showed no disposition to inflame, but, bearing all the characters of a typical tuberculous ulcer, slowly melted away the tip of the tongue, so that it then appeared as if the tip had been cut off by a knife. These ulcers are commonly seated at or near the tip, and from the tip may extend for some distance along the borders, or may spread back into the muscular substance. But they are not limited to the tip and borders and may occur on almost every part of the tongue, especially on various parts of the dorsum. They occur also on the frænum, which they destroy before extending to the tip. They attack men more frequently than women, and in this respect resemble cancerous and syphilitic ulcers. They are much more frequently observed in adults than in children, but there is no period of life to which they are strictly limited, for they have been observed in persons of all ages, from childhood up to sixty and seventy years of age. At first the ulcer (or ulcers, for there may be more than one) is indolent, not painful or very tender; but as the disease advances it grows more and more painful, and is extremely tender, the passage of the softest food over it being attended by excessive pain; and about this time salivation becomes a prominent symptom. As the sore increases and the patient's strength declines, sloughing may take place; the granular surface of the sore is lost, and it assumes more active characters. Or, without actual sloughing, it may rapidly advance, melting down, as it were, the tissues of the tongue, and laying bare the muscular fibres, so that they appear like the fibres of raw meat. The lymphatic glands beneath the jaw are enlarged in the majority of cases, but not invariably, although they might be expected to enlarge from the very nature of the disease, so prone is it to affect lymphatic glands. Hitherto the ulcer has been described as if it invariably pursued a downward course, and so, as a rule, it does, and death results within a few months, or at most a year or two. But this is not absolutely sure; the superficial tuberculous ulcers may heal, even after they have existed for many weeks or months, and have presented all the signs of tubercle, and been associated with symptoms of tubercle in other parts of the body. Yet, though they heal, their healing is,

for the most part, only for a time ; they break out again, sometimes after a year has elapsed, and the disease pursues its course to death. The woman whose case has just been described had tuberculous caries of the nasal bone of the right side, and the scars of numerous abscesses in the neck and beneath the floor of the mouth, and some of her glands were enlarged. She said that several of her mother's family died of consumption, and that her two only brothers died of scrofula and consumption. These associated signs of tubercle and such a family history must be sought for, and may often be obtained in cases of tuberculous ulcer of the tongue ; but the absence of them must not be taken as a proof that the disease is not tuberculous.

The *general anatomy* of tuberculous diseases of the tongue is referred to at the beginning of this chapter.

The tuberculous ulcer occurs both as a *primary* and as a *secondary* manifestation of tubercle. Primary ulcers of the tongue are, indeed, extremely rare ; but several cases have been recorded in which the disease of the tongue has preceded, by several months or longer, the symptoms of tubercle of other parts of the body. Secondary ulcers are much more common ; they are usually associated with tuberculous disease of the lung and larynx, or of the lung alone ; and after death, the glands, the spleen, kidneys, liver, and other organs, are often found to be also affected. The frequency with which tuberculous disease of the tongue is associated with similar disease of the lungs and larynx raises some interesting questions with regard to the relation of the lingual to the laryngeal and pulmonary disease. Speaking generally, it may be said that the tongue is far more often inoculated from the lungs, than the lung and larynx from the tongue.

The *diagnosis* of a tuberculous ulcer, in the absence of any other signs of tubercle, is admitted by all observers to be extremely difficult. The diseases for which it is most frequently mistaken are syphilis and carcinoma. The signs which can be chiefly relied on in the diagnosis of a syphilitic from a tuberculous ulcer are, that tertiary syphilitic ulcers more often affect the middle, and not the lateral, portions of the tongue ; that gummatous ulcers are associated in

most instances with much more tumour formation than tuberculous ulcers; that gummatous ulcers are, for the most part, much deeper, with undermined edges; that the lymphatic glands are never affected in association with syphilitic tertiary ulcers, but are not infrequently enlarged in connection with tuberculous sores. These signs, however, are thus marked only in the most typical examples of each disease. In many cases the diagnosis can only be made by observing the associated symptoms of syphilis, or by testing the effect of treatment. The history of the case and the family history of the patient may also throw light on the nature of a doubtful case.

The diagnosis between tubercle and cancer is even more difficult than between tubercle and syphilis. The same seat is common to both diseases; enlargement of the lymphatic glands may occur in both; men are more liable to both than women; and both diseases may have their origin in an injury. In typical cases, the absence of decided induration of the borders of a tuberculous sore, the sodden condition of the adjacent portions of the tongue, the pale pink colour of the surface of the sore, the presence of caseous material, and the tiny yellow points or patches in the surrounding mucous membrane, serve to distinguish a tuberculous ulcer. Tuberculous ulcers may occur, too, in persons far too young to have cancer of the tongue. But in the most difficult cases the diagnosis is almost impossible from a comparison of the general characters of the two diseases. Nedopil tells how all of the four primary tuberculous ulcers he had seen were cut out, on the assumption that they were cancerous. The effect of treatment cannot be tested as for syphilis, for treatment has little effect on either disease, unless the treatment is removal. These are the cases in which the examination of a bit cut out of the margin of the ulcer is of value. It does not, indeed, always prove the tuberculous nature of the doubtful sore, but it affords clear proof, in many instances, that a doubtful ulcer is cancerous. The discovery of the tubercle bacillus is difficult, and is rarely made.

The *prognosis* of tuberculous ulcer of the tongue is almost as unhappy as that of carcinoma. Not only is the disease

fatal, but it is usually fatal within a few months, or from one to two years, and its downward course is accompanied by great distress and pain. The patient is to be regarded as fortunate if he is relieved by rapidly progressive tuberculosis of the internal organs before the ulcer of his tongue has become very large and painful. Yet, there can be no question that tuberculous ulcers of the tongue do heal. The cure is, indeed, but temporary; the disease returns, and the second outbreak is almost invariably incurable and fatal. Tuberculous ulcers are also prone to vary from time to time, changing their aspect with the general fluctuations of the disease, causing less pain and salivation when they are more healthy, becoming more troublesome when they are progressive. It may be wondered why the prognosis of a case of tuberculous ulcer of the tongue should be so much worse than the prognosis of a case of tuberculous disease of the lymphatic glands or of one of the bones. In the one case, death is predicted in almost every instance, and the duration of the disease is set down as probably a year or eighteen months; in the other case, the diseased organ may be repaired either with or without operation, and the prognosis, as regards the patient's life, is certainly not bad. If the disease is limited to the affected part, even though the prognosis be bad for that part, it is for most persons not bad for the whole body. We believe that the answer to the question of the relative prognosis of tuberculous ulcers of the tongue and other parts of the body will not be found in any essential difference in the general or anatomical characters of the disease, but in the conditions with which it is associated. If the ulcer of the tongue is secondary, it usually occurs late in the course of active tuberculous disease, in persons already rapidly declining. If it is primary, there is probability of infection, while the ulceration itself is, or speedily becomes, a serious cause of debility, at all times interfering with the comfort of the patient, but especially hindering the taking of sufficient food.

The *treatment* of tuberculous ulcer of the tongue would probably be more successful if the impression were not so strong that the disease must necessarily be fatal, that the ulcer itself is incurable, and that it is useless to do

anything for so intractable a disease. We would urge the desirability of free removal of primary tuberculous ulcers, even if the disease is very extensive and the operation involves the removal of a large part of the tongue. Our experience of the operative treatment of such cases has been very happy. Two cases particularly occur to us. Several years ago Butlin removed a large part of the tongue of a gentleman between fifty and sixty years of age, who was suffering from extensive warty ulceration of an old diseased tongue (leucomatous). The characters of the disease and the presence of long-standing leucomata naturally led to the view that the disease was malignant. The operation was therefore very freely performed. Now, after several years, the patient remains free from tuberculous disease, in spite of the extensive tuberculous affection of his tongue. In the other case, the tongue of a lady was very deeply and extensively ulcerated, so that the removal of two-thirds of the tongue was needed to clear the disease. Between one and two years have elapsed since the operation without recurrence of the disease. Bull also speaks favourably of removal of the disease even when it is very extensive. But Weir relates that in five out of seven cases in which the *entire* tongue had been removed for tuberculous disease, tubercle had been observed shortly afterwards in the surrounding parts.

Even if the ulcer is secondary, it may be removed, to the great relief of the patient, provided it is not very extensive and the general condition will permit the operation to be performed. Every care in such cases should be taken to procure healing of the wound by the first intention, otherwise the open wound may be immediately inoculated, and the patient may be worse off than before the removal of the ulcer.

If an ulcer cannot be cut out, it may, nevertheless, be improved and, possibly, healed by care and appropriate treatment. It is essential that everything which irritates or rubs the sore should be removed, or that means should be taken to protect the ulcer. Carious teeth and stumps should be removed, and rough teeth which may not be removed must be covered with a smooth and well-fitting

plate. Very hot food should be avoided, and all care should be exercised in arranging the diet that the ulcer may be as little irritated in the taking of food as possible. And, that the movements of the tongue may be diminished, the solid food should be finely minced or chopped, and every mouthful should be mixed with fluid, that mastication may be avoided, and swallowing rendered very easy. If, in spite of these precautions, the taking of food is fraught with so much pain that a sufficient quantity is not got into the stomach, the patient's strength may be maintained by nutrient suppositories and enemata. The local treatment of the sore should be absolutely non-irritating. The application of nitrate of silver and other caustics should be avoided. Borax and chlorate of potash lotions may be used at frequent intervals, and weak astringent lotions of alum or tannin or sulphate of zinc may be used if the ulcer has been healing, but is flagging. Benefit will be derived from the following or some similar application: Finely-powdered iodoform, one grain; morphia, one-sixth to one-half of a grain; borax, three grains. Before the powder is applied the surface of the ulcer must be very carefully cleansed, and dried with a soft brush or a little lump of absorbent cotton-wool. The powder must then be dusted thickly, or blown through a glass tube over every part of the sore. This procedure may be repeated three, or even four, times in the course of the day, but the quantity of morphia in each powder must depend on the frequency with which the powder is used and on the effect which it produces.

The effect of painting with cocaine may be tried. Orthoform may be insufflated just before meals. If there is a cavity or fissure, it should be kept filled from the bottom with a strip of soft iodoform gauze, with great relief to the patient.

2. Leprosy of the Tongue.

In tubercular leprosy the surface of the tongue may be the seat of tubercles or patches formed of tubercles (Fig. 13). Vandyke Carter says that the dorsum of the tongue may be studded with distinct pale tubercles; and, as on the palate, superficial ulceration may co-exist. The sense of taste appears to be seldom impaired, but one patient complained

of a feeling of heat in the mouth while eating, and another declared he could not taste even pungent condiments.

In 1885, an Englishman, suffering from typical anaesthetic leprosy, affecting the face, palate, etc., was an inmate of St. Bartholomew's Hospital, under the care of Dr. Andrew. He had a number of nodules on the dorsum, borders, and tip of the tongue, some of which were as large as peas. Mr. Godart made a drawing of the tongue, which is preserved

in the collection of illustrations of diseases of the tongue presented by Mr. Butlin (Plate IX., 3). A photograph of a specimen of a leprous tongue preserved in the Museum of the Royal College of Surgeons (No. 2274E) is shown in Fig. 13.

We are not aware whether the tongue is ever the primary seat of leprosy.

3. ACTINOMYCOSIS OF THE TONGUE.

This is an affection of the tongue almost unknown in this country, only one case having apparently come

under notice. On the Continent, especially in Germany, the affection is more frequent, and enters into the consideration of the causes of nodules in the tongue.

The disease nearly always originates by the lodgment of a fragment of dried corn, either a piece of the grain, or husk, or awn belonging to wheat, barley, oats, or some grass, with which the fungus is carried in. Boström says that as the corn dries, the cells of which it is composed shrink, leaving air spaces communicating with the surface by spores. Into these spores the mycelium of the fungus ramifies.

Illich describes thirteen primary cases in the tongue, in some of which the lodgment of the fragment was noted:



Fig. 13.—LEPROSY OF THE TONGUE.

Photographed from a specimen in the Royal College of Surgeons Museum, No. 2274E.

A remarkable nodular thickening covers the dorsal surface of the tongue.

a grain of corn driven into the tongue whilst a man was engaged in threshing, or a prick felt in the tongue whilst an ear of corn or grass was being held in the mouth. In other cases the entrance of the fragment had passed unnoticed. Maydl believed that a cattle inspector became infected by licking his thumb in order to turn over quickly sheets of paper dealing with the consignment of cattle, the papers having passed through the hands of cattlemen. Generally a small tumour is noticed, varying in size from that of a pea or bean up to that of an egg, slowly increasing in size, and of several weeks' or months' duration. It is only late that the tumour breaks down into an abscess, which ruptures, forming a foul fissure or ulcer. The tumour is at first superficial, and deep extension is late. Likewise, there is no infection of the lymphatic glands until late.

Although smoking and the presence of ulcers from carious teeth may well favour infection, most cases have been chance accidents, due to the habit of chewing blades of grass or corn. In the case under Cooper, reported by Hebb, a sailor, aged sixty, had a tumour the size of an almond situated one inch behind the tip of the tongue, and it was excised. On section of the tumour the centre was found to be yellow and cheesy, the wall showing mainly small-celled infiltration. A careful microscopical investigation revealed typical groups of the ray fungus. It is evident that such a tumour in a sailor without any history of its commencement could not have been distinguished from a syphilitic or tuberculous nodule except by the microscope.

ANIMAL PARASITES.

Animal parasites, of whatever kind, are exceedingly uncommon in the tongue. The echinococcus, the most frequently observed, and the cysticercus, are described in the chapter on cysts of the tongue. It only remains to say a few words regarding the dracunculus (guinea-worm) and the trichina spiralis, both of which have been observed in the human tongue.

1. **Dracunculus** (*filaria medinensis*; guinea-worm).

The first case on record is related by Davaine, who says the

patient was a young man under the care of Clot-Bey, and was treated in the hospital at Abou-Zabel, in 1825. He had a painful swelling at the tip of the tongue, near the frenum, was much salivated, with swollen and bleeding gums, and could not take any solid nourishment. The little tumour fluctuated; it was therefore punctured, and serous pus escaped. In the efforts which the patient made to spit, a portion of a guinea-worm was expelled. The worm was afterwards extracted by the method of rolling up which is usually practised for its removal.

If the theory be correct that the young filariae generally obtain entrance to the body through a sudoriparous duct or hair follicle, it may be suggested in this instance that the worm effected a lodgment beneath the tongue by entering one of the salivary ducts or, possibly, the duct of the Blandin-Nuhn gland. Hillier reports a similar instance in India. The patient had symptoms of glossitis, then of suppuration and abscess. A guinea-worm, three feet long, was found in the abscess cavity.

2. *Trichina spiralis.*

Trichina occurs in the muscles of the tongue as in those of other parts of the body; but trichina producing a definite tumour in the tongue, and apparently occurring there and in no other part, is quite exceptional. It is related in the Transactions of the Pathological Society of London, in 1849, by Dr. Miller, that a woman, forty-nine years old, had a circular, cupped, dense and painful tumour, about the size of a shilling, springing from the left border of the tongue not far from the root. The neighbouring parts were slightly indurated, and there was pain in the cheek, pharynx, and ear of the affected side. It is not distinctly stated at what time the tumour first was noticed, but the patient, who had been quite well until two years before the case came under the observation of Dr. Miller, was cachectic and ill.

No very strong opinion appears to have been expressed as to its exact nature; but it was regarded as suspicious, and was accordingly removed with ligatures. The examination was made by Mr. Dalrymple, who found that it was composed of trichinæ spirales. The further history of the

case is not recorded, nor is there an express statement that the patient was not elsewhere trichinous, but the character of the account leads one to infer that she was not so.

In patients suffering from trichinosis the tongue may be much swollen, resembling acute glossitis. A woman lately died of trichinosis in St. Bartholomew's Hospital having recently landed from America, in whom this occurred.

It is reported in the "Internationales Centralblatt für Laryngologie, 1894," that a Spanish Arab amputated a tongue because he mistook a trichina capsule for an epithelioma. Granted the disease to be limited to the tongue the treatment by excision would be correct.

CHAPTER XI.

SYPHILIS OF THE TONGUE.

Primary Syphilis : (a) Hard Chancre ; (b) Soft Chancre—Generalised Syphilis : (a) Mucous Patches or Tubercles and Tertiary Plaques ; (b) Superficial Atrophy ; (c) Nodes and Nodules—Gummata ; (d) Fissures ; (e) Ulcers.

NEXT after cancer, this is one of the most important diseases of the tongue and the most frequent in its occurrence. The common saying that syphilis apes all other forms of disease gives an expression to the fact that there is hardly any affection of the tongue in which the possibility of syphilis, inherited or acquired, should not be taken into account in making the diagnosis. Yet nothing leads to greater errors in diagnosis and treatment than the tendency to see syphilis in every form of obscure affection of the tongue, or to persist in a diagnosis of syphilis when a short and vigorous administration of anti-syphilitic remedies has proved of no service.

Cases of syphilis of the tongue can be divided into the uncommon primary infection and the generalised infection through the genitals or in utero through the mother. Primary syphilis of the tongue appears in the form of chancre. There is no essential difference between the acquired and the inherited form of syphilis except that the latter is rare. The use of the word mucous tubercle is liable to create confusion unless it is confined to the very earliest form of secondary syphilis, and the term is only used here in this sense.

1. Primary Syphilis of the Tongue.

(a) *Hard Chancre*.—A full account of this subject has been given by Fournier, which is here adopted, as hard sores have only been rarely observed and described in this country. Of 642 instances of extra-genital chancre 328 occurred on the lips and fifty-three on the tongue. Of

twenty-eight women with buccal chancre only two occurred on the tongue; whereas, among thirty-nine cases in men, eight were on the tongue. Of the causes to which a chancre of the tongue may be attributed, the smoking of pipes in common is the most important, and for allied reasons it has been noted among glass-blowers. The use of spoons and drinking cups in common, especially when these are passed round and are made of wood, as is largely the case in Russia, has been justly blamed. Soliber describes three cases in which a chancre was inoculated by kissing prostitutes. Griffin has described twelve very striking cases: several transmissions from one workman to another, three children of the same family suffered by transmission from one to the other, a chancre under the tongue of a woman was derived from her husband by kissing. The chancre has generally been seen on the anterior part of the dorsum of the tongue, less commonly on the tip, or sides, or underneath. It is nearly always single.

Two forms of hard chancre are seen, the one smooth, the other ulcerated. The smooth form is a slight erosion of the surface, on the same level as the rest of the tongue, having a smooth, regular, reddish base covered with greyish muco-pus. The outline is generally circular or oval, having a diameter of 1-3 cm. The induration of the base is well marked, and the submaxillary glands, as well as the deep cervical opposite the thyroid cartilage, are always enlarged.

The ulcerating form differs from the foregoing by involving the sub-epithelial tissues. Its shape is characteristic, like the bowl of a spoon with sloping sides.

Of the rarer varieties, one is the fissured chancre, occurring in one of the folds of the tongue, which are especially exaggerated in smokers. To see the chancre, the sides of the fissure must be drawn apart, when it appears to be composed of two branches like a V.

Another variety shows such widespread induration or sclerosis, that it is difficult to distinguish from malignant disease or parenchymatous glossitis. Phagedena has been observed, but is very rare.

The smooth chancre gives little trouble, the ulcerating

form causes pain and salivation, but never so severely as does tubercle or cancer. The enlargement of the glands may be bilateral when the chancre is situated well to one side, or, indeed, those of the opposite side may be chiefly involved. These variations are also met with in cancer, and are due to peculiarities in the anastomosis of the lymphatics.

The characteristics of a chancre, then, are the rapid origin, the induration, and the enlargement of the glands, with the certain appearance, before long, of a roseolous rash. It may be mistaken for a traumatic or a tuberculous ulcer, and the diagnosis may be almost impossible until the appearance of constitutional syphilis.

The treatment of chancre of the tongue is that of a primary sore elsewhere, with the addition of a powder of iodoform or orthoform to the sore, or a mercurial lotion. Smoking should be forbidden, and the patient should be warned of the infectious character of the sore and of the saliva.

(b) *Soft Chancre or Sore on the Tongue*.—This is again a subject upon which there is nothing written in this country. In the course of the discussion upon the case described by Emery and Sabourand, Fournier said he believed that it was the first case in which the occurrence of soft sore on the tongue had been demonstrated. A man, aged twenty-five, had had gonorrhœa five years before and syphilis three years before. The secondary symptoms which followed were a roseolous rash, buccal mucous plaques with swelling of the maxillary and inguinal glands. Subsequently he had each year an attack of small, greyish, painful ulcers on the tongue, which quickly healed. As evidences of past syphilis the glands remained chronically enlarged. There were no evidences of tubercle.

January 4th.—Le malade a des rapports avec une femme de rencontre. Il pratique le coït et le baiser vulvaire.

January 7th.—He first noticed the existence of a small ulceration on the free edge of the prepuce. On the 8th there were two more ulcers alongside the first, and a fourth on the under-surface of the penis, 4 cm. in front of the scrotum. There was also a painful swelling of both sets of inguinal glands. At the same time the patient noted on the

dorsal surface of the point of the tongue a small fissure, running antero-posteriorly, 1 mm. in breadth; the sides of the fissure were red, not bleeding or painful.

January 14th.—When first seen by Fournier, there were four typical soft sores on the penis, a bubo threatening suppuration in each groin, an ulcer on the dorsal surface of the tip of the tongue to the right of the middle line, having an irregularly circular, sinuous outline 6-7 mm. in diameter. The edges were sharply cut, slightly undermined and raised, but not indurated, the base was a healthy rose red, covered by a greyish-white non-adherent pultaceous layer. The right submaxillary glands were enlarged, and, as well as the left inguinal glands, formed an abscess which was first punctured, then incised. The right inguinal bubo subsided.

January 15th.—He was inoculated in the left deltoid region with material scraped from the ulcer on the tongue. The next day a small hollow ulcer had formed, covered by pus, underneath a scab which Fournier recognised as the typical result of inoculating from a soft sore; three days later the inoculation from the tongue was repeated on the right arm with the same result. The bacillus of Durey-Unna, which Fournier recognises as the cause of soft sores, was found both in the sores of the penis and in the ulcer of the tongue; but the pus from the glandular swellings yielded no microbe whatever. All the sores healed in a month, iodoform being applied to the penis and antiseptic washes used for the tongue.

2. Generalised Syphilis.

(a) *Mucous Patches or Tubercles*.—An affection belonging to secondary syphilis, for which the better term would be mucous plaques, for they far more often assume the form of plaques than of tubercles. It will be more convenient to retain the term "patch" than that of tubercle or condyloma in this section. They may occur at any time during the period of secondary syphilis, but belong rather to the middle and later than to the earlier symptoms. Yet they may occur quite early, associated with affections of the throat and other parts of the interior of the mouth, with the first outbreak of eruption, and with the falling-off of the hair.

Mucous patches may form on any part of the tongue, on

any part of the dorsum, on the borders, at the tip, and on the under aspect ; but they occur more frequently on the border than elsewhere. They may be met with at any age, for they belong to congenital as well as acquired syphilis ; but they are much more often seen on the tongues of young adults than at any other time of life. They may be found in both sexes, but are more often observed in men than in women.

Mucous patches are usually multiple, and are accompanied by other signs of secondary syphilis, by similar patches or ulcers on the inside of the lips and cheeks, or on the palate, by ulceration and mucous patches on the tonsils, by sores at the angles of the mouth, and by symptoms of syphilis on other parts of the body. Occasionally, however, a single patch occurs on the border of the tongue, and, for the time at least, no other sign of syphilis is present. Attention will be again called to this point when the diagnosis of the disease is considered.

The *appearance* of mucous patches varies considerably, and depends largely on the part of the tongue on which they rest. The best examples are those which occur far back on the dorsum or on the under aspect near the tip, for in these parts they are very little liable to be injured or modified by the rubbing of the teeth. A typical mucous patch on the dorsum, near the circumvallate papillæ, is generally rounded or oval in form, and appears as a greyish-white plaque, raised to the extent of perhaps half a line above the level of the surrounding parts (Plate VI., Fig. 2). It is sharply defined, but the border is not usually perfectly smooth, but is wavy or projects at irregular intervals. Nevertheless, the oval outline is, on the whole, tolerably well maintained, even when the patches are of considerable size. Immediately beyond the border of the patch the tissues are quite natural ; there is no redness or swelling, unless there is an accidental inflammation. The surface of the patch is sometimes quite smooth and even, but is not unusually broken by depressed lines, by cracks and fissures. The whiteness is not opaque, but it is not nearly so transparent as the bluish-whiteness of the patches of leucoma, and it has a faintly granular aspect in many cases. The white layer may be more or less completely removed, and

may leave behind a smooth, red, slightly raised base, which is defined by its smoothness and greater redness from the surrounding parts.

On the under aspect of the tongue, where the patches are as little as possible disturbed, either by the teeth or by the passage over them of food, they not infrequently appear as excellent examples of condylomata, warty, cauliflower-like (Plate VI., Fig. 3). The surface of each growth is white, and, as a rule, a more dead white than that of the patches on the dorsum. The base of each is often slightly constricted, but they are very rarely much elevated, for the conditions under which they grow and the soft materials of which they are composed are not favourable to large development. If they reached a greater height than a quarter of an inch, they would speedily be rubbed down and flattened out by the surrounding gums and teeth. These little condylomata, like the mucous patches on the dorsum, are absolutely free from any signs of inflammation.

On the tip and borders the characters of mucous patches are often so modified that the appearances they present are very different from those which have been described. The patch is still raised and still white, and often roughly retains its oval shape, but the borders are frequently sinuous or deeply notched, and immediately beyond is a bright red areola, extending for about an eighth of an inch into the surrounding natural red, in which it gradually fades (Plate IV., Fig. 1). The surface of the patch, instead of being smooth or warty, is ulcerated, or deeply grooved and hollowed out, or marked by vertical lines of red and white alternately; and all this is due to the pressure or rubbing of the teeth or stumps of teeth. The extent to which a patch on the border of the tongue may be altered depends, of course, on the thickness or height of the patch, on the condition of the teeth, and on the condition of the tongue, which may be generally larger than it ought to be, so that the patch is pressed outwards against the teeth. The ulceration may be merely superficial, and may affect only a part of the surface of the patch; or it may be so deep and so extensive that it not only almost wholly destroys the patch, but eats deeply into the substance of the tongue as well. On the other

hand, I have seen patches on the borders which, on account of their very slight elevation, and of the small size of the tongue and smoothness of the teeth, were nearly as well preserved as the patches far back upon the dorsum.

The first appearance of the mucous patch is usually in the form of a very small and slightly raised white-grey spot, perhaps not larger than a small split-pea; but it quickly enlarges, without any sign of inflammation, and, unless it be ulcerated or injured, is probably for a long time unnoticed by the patient. Several patches may coalesce, and in this manner some of the large and most irregularly-shaped patches are formed. The entire patch may continue to enlarge in all its diameters so as to preserve the original shape of that which first appeared; or it may put forth tongue-like projections, which spread over the adjacent surface of the tongue, and are recognised by their yellower colour and less thickness when compared with the original patch. If they are left untreated, mucous patches may remain for a long time very little altered, or they may slowly extend until a large part of the surface of the tongue is covered by them, or they may undergo some of the changes which have been described, may lose their white coating, or may ulcerate on account of the irritation they are subjected to. They may heal, too, spontaneously, for many persons pass through the entire period of secondary syphilis without treatment, and all the symptoms disappear. The worst cases, however, come under treatment, and we can certainly say that we have watched mucous patches, especially the condylomata on the under aspect of the tongue, for many months, and have noticed no alteration in them, although afterwards an application of chromic acid has caused them to disappear entirely in the course of a few days.

It must be borne constantly in mind that the secretion which comes from these mucous patches and the discharge which proceeds from the ulcers which form in them is *contagious*. A person, therefore, who is suffering from mucous patches and other secondary affections of the interior of the mouth, especially from secondary sores on the lips and at the corners of the mouth, is dangerous to those with whom he lives and with whom he works. He should

be warned against kissing when his mouth is sore, against allowing other persons to use the same glass and pipe as he uses, the same fork, and the same tools, if they are used within the mouth. Mr. Hulke mentioned a boy under his care who had contracted syphilis by using his neighbour's blow-pipe in the shop in which they were employed. So, also, we have seen a young woman with a primary sore upon her nipple, which she said had been produced by a child which she had taken to bed with her for several nights seizing her nipple in the night and sucking it. The child was brought in the following week, and was found to be suffering from syphilis, with mucous patches on the tongue and at the corners of the mouth. Such accidents cannot be too carefully guarded against; both the patient and the patient's friends must be warned of the danger, even at the risk of exposing the character of the disease from which the patient suffers. This, indeed, is seldom necessary; it suffices usually to state decidedly that the disease is contagious, and to point out the manner in which it may be contracted.

With regard to the *frequency* of mucous patches on the tongue, they are not nearly so common there as about the anus and the vulva. Bumstead and Taylor, quoting from the statistical tables of Bassereau, note that in one hundred and thirty men mucous patches were found around the anus 110 times, upon the tonsils 100 times, and upon the tongue only 18 times. Further, they refer to the statistics of Davasse and Deville, who examined one hundred and eighty-six women, with the result of finding mucous patches upon the vulva 174 times, about the anus 59 times, on the tonsils 19 times, and upon the tongue only 6 times. The much larger proportion of men suffering from mucous patches on the tongue has led to the conclusion that probably a determining factor, as well as the generalised syphilis, is active in producing mucous patches on the tongue. This may be found, as Bumstead and Taylor suggest, in the use of tobacco by men. Chewing and smoking are liable to irritate the surface of the tongue, and the slight irritation or congestion determines the formation of a mucous patch. This, however, would scarcely account for the frequency

with which the patches are found on the borders of the tongue; it is probable that the irritation of the teeth produces quite as considerable an effect as the irritation of tobacco. Certainly we have more than once seen mucous patches on the border of the tongue directly opposite a rough tooth or stump, the only rough or carious tooth on either side.

In the large majority of cases the *diagnosis* of mucous patches is easy. The patches themselves are very characteristic, and the accompanying signs of syphilis render it impossible to err. But occasionally they may be mistaken for leucomata, or aphthæ, or wandering rash, or even warty growths. The diagnosis from leucoma depends partly on the difference in the colour of the patches, which are not pearly, like leucomatous patches, but greyish-white, as if they had been painted over with a nitrate of silver stick. Mucous patches occur much more often on the borders, leucoma patches on the dorsum of the tongue; mucous patches are much more often deeply ulcerated than leucoma patches. Leucomas, when thick and white and raised, and, therefore, most likely to be taken for mucous patches, are, as a rule, much harder and drier than mucous patches. Leucoma usually runs a very slow course, mucous patches a comparatively quick course. But the presence of associated signs of syphilis in the large majority of instances makes the diagnosis perfectly clear. In aphthæ and in mucous patches the patches are white, but the white patches of aphthæ belong almost exclusively to children or to adults who are suffering from very severe illness, while the white patches of syphilis occur almost exclusively in adults, and, for the most part, in adults who are in good, or, at least, not in bad health. In doubtful cases a microscopical examination will prove the nature of the disease. And, once again, the associated signs of syphilis are rarely absent. The diagnosis from wandering rash has been described in Chapter VII. (1) at p. 100. The diagnosis from that very rare condition, diphtheria of the tongue, must depend on the swelling of the base of the tongue, the diphtheritic patch, the general fever, and on the presence of associated signs of diphtheria in the neighbouring parts as well as the finding of the bacilli. In

the case of diphtheritic inflammation, and the formation of membrane over a wound, the history of the wound and the general illness of the patient tell the character of the disease. Lastly, it may sometimes happen that warts or warty growths are mistaken for the warty syphilitic tumours. True warts are more common on the dorsum of the tongue, are usually of very slow growth, and are often decidedly of papillary origin. But the diagnosis is rendered easy by the presence of associated signs of syphilis, and by the result of treatment, which is speedily effectual in removing syphilitic warty growths, but is almost useless against actual tumours.

The *treatment* of mucous patches was at one time—and, indeed, until quite lately—regarded as very unsatisfactory, not because the patches could not be cured, or because they led to deep ulcers or to serious mischief, but because they remained so very long uncured. Yet the patients were treated with mercury in sufficient doses, and, being anxious to be rid of the trouble in the mouth, appeared to have taken the medicine regularly. Many local applications were employed without avail, until it occurred to Butlin to try the effect of a solution of chromic acid on them. The result was magical, for the patches and warty growths, which had remained unmoved during many months of treatment, now disappeared in the course of a few days. Since that time we have used a ten-grain solution of chromic acid largely in the treatment of secondary syphilitic affections of the interior of the mouth, and especially for the relief of mucous patches, and almost invariably with a good result. A few cases have resisted the effect of the acid, and it has then been found necessary to remove some source of irritation; a carious tooth, for example. The patches appear to melt away under the influence of the acid. We have never, indeed, used the chromic acid without, at the same time, treating the patient internally with mercury in the form which seemed most suitable to his individual case, so that we cannot say whether the chromic acid would be equally effectual if used alone.

In out-patient practice the only objection to the use of chromic acid is that it relieves the patients too quickly of

the annoyance which the mucous patches cause them, and they are, therefore, unwilling to attend sufficiently long to be thoroughly treated for their constitutional syphilis. This objection, which we should be disposed to regard as trivial had we not often found it to be the case, is, however, more than counterbalanced by the advantage to the community of removing as speedily as possible a source of syphilitic contagion.

It is not needful to enter into the constitutional treatment of syphilitic patches ; it differs in no respect from that which is adopted for the cure of constitutional syphilis generally.

(b) *Tertiary Syphilitic Plaques and Sclerosing Glossitis.*—The affection we are about to describe under this name is scarcely mentioned either in works on syphilis or on the tongue. It is, however, carefully described by Fournier, and the account of it which he has given deserves to be studied. We have only seen a few instances of it, and yet it must be more common than the small number of cases we have seen, and the absence of descriptions, would lead us to believe. For the tertiary plaques are said by Fournier to precede, and be the cause of, the deep fissures and furrows which one sees in old disfigured tongues, where the surface of the tongue has been absolutely ploughed up by past syphilis.

We will describe two cases, of which we have sketches by us at the present moment, and which may be taken as corresponding to the deeper sclerosing glossitis of Fournier.

The first is the case of a man, fifty-six years old, who was under care in the out-patient room at St. Bartholomew's Hospital in February of 1882. He had suffered from syphilis many years previously, and had been accustomed to smoke and drink a good deal, although lately his tongue had been so tender that he had been compelled to diminish largely the amount of spirit and tobacco. As far as could be ascertained, he had suffered from superficial glossitis for many years, but when he came to the hospital he was quite ill, on account of an acute attack which had supervened upon the old inflammation, and which had produced sloughing of the surface at three separate points : in neither

of them deep destruction, but in all sufficiently deep to leave shallow ulcers and to give the man great pain, especially when he took food into his mouth. But the feature of the disease was the presence of a singular plaque, or tubercular mass, in the middle of the dorsum. It was of oval shape, and measured about an inch and one-third by one inch, and in its central parts, which were the most elevated, it stood about one-eighth of an inch above the level of the surrounding dorsum. It had the appearance of having been formed by the meeting of half-a-dozen flattened tubers, one in the centre and five around, for there were deep furrows or clefts, breaking up its surface into several different segments, but of different sizes. Each segment was smooth, dull red, flattened on the summit, but rounded where it met the adjoining segments. The whole of the plaque was firm and elastic, and quite insensitive, except where it was affected by the acute inflammation which had seized the fore part of the tongue. And only at this inflamed part was there any sign of ulceration which was not deeper than the superficial ulceration of the fore part of the tongue. The patient was not sure how long this plaque had existed, for it had given him no trouble, and he would not have applied at the hospital on account of it had he not been driven there by the sharp attack of inflammation which caused him so much distress. As soon as he was relieved of this, his visits ceased.

The second case is more interesting for several reasons, for the progress of the disease was watched from first to last, and the objection which may be made against the first case, that the diagnosis was not absolutely certain (of syphilis), cannot be maintained in this. The patient, who was thirty years of age, was also under care in the out-patient department of St. Bartholomew's Hospital for a very long time on account of extremely severe tertiary syphilis. He first came in February, 1881, when he was suffering from several smooth plaques on the left half and border of the tongue. The plaques were three in number, of irregularly rounded shape, very smooth, raised to the extent of half a line to a line, and rather higher in the centre than at the borders, and redder than the surrounding

parts; even where there was no fur, they were well defined. At first they were thought to be ordinary *gummata*, but, on closely examining them, it was found that, although they measured from a quarter to three-quarters of an inch across, they had scarcely any depth; they were, however, firm and almost parchment-like. The primary attack of syphilis had been about four or five years previously, and the secondary symptoms had lasted for rather more than a year. Since that time he had had ulceration of the scalp and skin of the forehead, and while he was under care ulcers broke out in various parts of his body as well as on his tongue. The patches on his tongue had been noticed for about two months past: first one of them had appeared, then the other two, and they had slowly increased in size. It was not certain whether they were superficial *gummata* or whether they corresponded with the tertiary tubercular syphilitic which one sees not uncommonly on the face and other parts of the surface of the body. In either case the treatment was the same, so he was put on iodide of potassium, and the plaques were painted with bieyanide of mercury. Under this treatment they soon improved, but, owing to his irregular attendance at the hospital, and consequently to his being without medicine for a week or more at a time, the largest of them grew larger still, and without becoming more prominent, broke down into ulcers, not absolutely superficial, yet not deeper than the eighth of an inch. Under renewed and more regular treatment they soon healed, leaving superficial, yet clearly discernible, scars. The other plaques disappeared without ulcerating. In November of the same year he returned to the hospital with a fresh outbreak of syphilis of the scalp and neck, and a singular plaque in the middle of his tongue, of which Mr. Godart made a sketch. It was about an inch long, and made up of two separate oval plaques, which afterwards coalesced, and increasing considerably in size, formed a single plaque, measuring two inches long by three-quarters of an inch across. It rose almost abruptly from the dorsum, and in the centre reached a height of about one-eighth of an inch, but was a little less elevated at the sides. It was perfectly smooth and of a deep red colour, but with a decided purple tint. Down

the centre ran the groove formed by the meeting of the two original plaques. The whole plaque was glazed and shiny, and was at no point broken or even slightly cracked (Plate VII., Fig. 1). It felt very firm, but the firmness did not extend far into the substance of the tongue. The rest of the dorsum was healthy, except for the trivial scars on the left half, and two lumps, gummato^s, on the right border. There were no signs of inflammation about the central plaque or in connection with the gummata. Five grains of iodide of potassium and a drachm of the liquor hydrargyri bichloridi were administered three times a day, and the surface of the tongue was ordered to be painted several times daily with a ten-grain solution of chromic acid; but at the end of a couple of months there was no improvement. He was then put on ten grains of iodide of potassium and half a drachm of the bichloride, with the result that, although the chromic acid was left off, and no external application was employed, the plaque quickly diminished in size, and at the end of another month had melted away. There was never at any time ulceration; the plaque disappeared, without leaving any trace of its existence. Of course one cannot say what course it might have pursued had it been left untreated.

Fournier's account of the *sclerosing glossitis* of tertiary syphilis is that it produces cellular hyperplasia, which infiltrates the tissues of the tongue. In process of time these patches or areas of cellular hyperplasia multiply, then become organised, condensed, and end by forming a fibroplastic, fibroid frame. With the organisation and condensation of the frame there occurs contraction, so that the natural tissues of the tongue are strangled and atrophied, and in this manner cirrhoses, or more properly scleroses, are produced.

He divides the lesions into superficial or cortical, and deep or parenchymatous.

The superficial sclerosing glossitis takes the form of superficial indurations, which are developed in the derma of the mucous membrane. They are extensive and lamelliform; either isolated plaques of variable extent and form, from the size of a threepenny-piece to that of a haricot

bean, usually rounded or oval, easily perceptible to touch, like discs of parchment, of deeper cherry red than the normal surface of the tongue, uniform and smooth, without papillæ, often not at all elevated above the surrounding surface. Or they form continuous plaques, covering two to four square half-inches, or even more, and presenting similar characters to the isolated plaques. Both the isolated and the confluent plaques are prone to break down with the production of fissures, chaps, chinks, erosions, and ulcers. The sore places are not usually painful. The disease is very chronic, and leaves behind milk-white patches.

The deep or parenchymatous sclerosing inflammations are generally both deep and superficial, but they may be limited to the deeper parts. They are characterised by swelling on the dorsal aspect of the tongue, which is later followed by atrophy. The surface of the dorsum is mammilated and lobulated, and the lobulation is like that of the surface of the liver in cirrhosis. It is so frequent a symptom of syphilitic sclerosis that it is almost pathognomonic of syphilis. The central parts of the dorsum are the most frequently affected, but the borders may also be attacked, in which case the dental arcade is marvellously reproduced upon the tongue. Another character is deep induration of the affected parts, not unlike that of cancer. Lastly, there is morbid redness, of a vinous hue, of the mucous membrane, which is smooth and without papillæ. Erosion and ulceration may occur from various causes, and are especially liable to affect the furrows and fissures which result from contraction of the organised tissue.

A rare variety of sclerosing glossitis is that in which the disease is generalised, when, with the preceding signs, the entire tongue is enormously swollen and hard, the so-called syphilitic macroglossia.

The course of all the sclerosing inflammations of the tongue is essentially chronic; and if they are left untreated they are prone to break down and ulcerate, but the ulcers are rarely deep or difficult to heal. The lymphatic glands are practically never enlarged in association with them, although it is not impossible that inflamed and ulcerated plaques may produce enlargement of the glands.

Fournier gives an elaborate account of the *diagnosis* between these sclerosing inflammations and various other affections for which they may possibly be mistaken. In this category he places indurated lingual chancre, lingual psoriasis, smoker's patch, and dental glossitis. But it is difficult to understand how any of these diseases can be mistaken for the disease which has been described. Nor do we see how epithelioma of the tongue is so likely to be mistaken as Fournier supposes, unless in those rare cases in which the syphilitic affection is much deeper and more gummatus than usual. The local condition is for the most part quite characteristic, and when there is doubt, there are almost always other signs of syphilis, either of the tongue or of some other parts of the body, which help to solve the question of the nature of the disease. The effect of treatment is, too, speedily useful in determining the syphilitic origin of the plaques. At a later period, when the tongue is fissured and furrowed by the contraction of the plaques and trabeculae of syphilitic scar tissue, there is little fear that any other disease will be taken for it.

The *prognosis*, if the disease is extensive, or if it has been untreated or has been imperfectly treated, is bad, for the tongue is generally horribly disfigured by the subsequent contraction. The plaques of sclerosing glossitis are, too, almost always associated with the formation of gummata in the tongue, and these, breaking down, increase the deformity. But if the affection is treated early and thoroughly, the result is generally good. In the same way that gummata are completely removed under appropriate treatment, provided the treatment has not been too long deferred, the plaques of sclerosing glossitis apparently may be resolved by treatment.

In the *treatment* of sclerosing inflammations, whether superficial or deep, iodide of potassium plays by far the most important part. It may at first be administered in doses of five to ten grains three times a day; and if a decided effect is not speedily produced, the dose may be increased rapidly to twenty-five or thirty grains. With iodide of potassium, the solution of the bichloride of mercury may be given; and in most cases cod-liver oil and tonics

are useful, for the patients are usually in defective health. In the stage of the disease in which contraction has taken place little or no benefit is to be expected from anti-syphilitic treatment. The disease has done the worst of which it is capable, and the only result which can be hoped from treatment is to palliate symptoms as they arise. In the majority of instances local treatment is not necessary, and, indeed can do no good. But when the plaques are ulcerated and are sore, they may be painted with a solution of chromic acid, or may be rubbed, as Bryant recommends for gummata, with a mass of blue pill.

When there are deep fissures in which organisms lodge, the patient is much relieved by the thorough painting over the tongue every day of perchloride or bicyanide of mercury, 1 in 1,000, part of the value of which is the destruction of micro-organisms which increase the inflammation. Heath recommends that the mouth should be filled with the solution for five minutes, but this is only suitable for careful patients who would not swallow the fluid.

(c) *Syphilitic Atrophy*.—A very different result of syphilis was noted by Virchow in 1863, and his observations have been recently confirmed by Lewin and Heller, but are not accepted by all authorities.

The disease is said to consist in a gradual shrinkage of the lymphatic gland follicles until they completely disappear from the centre of the base of the tongue behind the lingual **V**, but some remains of the lymph follicles are always to be found at the sides. The epithelium remains normal, and there is no small-celled infiltration, simply a smooth atrophy, which they believe to be important as showing the continuance of the syphilitic virus. The observations are supported by drawings and microscopic sections.

(d) *Syphilitic Nodes and Nodules; Gummata*.—Nodes and nodules of syphilitic origin may occur on the tongue at any time during the period of tertiary syphilis, but they do not belong to the period of secondary syphilis, unless sometimes mucous tubercles and condylomata take the form rather of lumps than of plaques or of warty growths. The tertiary lumps may appear in one of two forms: firstly as gummata, when the syphilis is still active in the patient;

secondly as lumps of various size and shape, which are produced by the contraction of past syphilitic lesions, when the syphilis is no longer actively present in the system. The first condition is infinitely more common and far more important than the second; the diagnosis is not always easy; the effects are often very destructive, and the treatment is very successful. The second form is frequently very distressing, and the tongue is horribly disfigured, but the diagnosis presents no difficulties, and the disease is not amenable to treatment, except in so far that active symptoms which arise from time to time may be successfully dealt with.

Gummata.—In the following section on ulcers are described gummata when they have broken down, and here we limit the description to gummata during the earlier period of their existence, when as yet there is no ulceration.

Unbroken gummata may be quite superficial, or deep (or, as they are sometimes called, parenchymatous). Both forms are much more frequently observed in males than females, and may occur at any time during the period of tertiary syphilis, but on the whole are seldom observed until several (four or five) years have elapsed since the appearance of the primary disease. The *superficial gummata* occur more frequently upon the dorsum than at the tip or borders. They form nodes and nodules of very various size, from a pin's head to that of a pea, and project in the mucous and submucous tissue, where they may be seen and felt as little hard bodies, not always very well defined, often, indeed, continuous with the tissues of the tongue, not movable apart from the surrounding tissues. They are at first quite indolent, not causing any pain, and perhaps not noticed unless they project more than usual, or are larger than usual, or are irritated. The mucous membrane covering them is at first papillated, if they occur in the papillary area; but if they are very superficial, or when they extend towards the surface, it becomes quite smooth. At first, too, it has the natural colour of the dorsum, but by-and-by it becomes redder. It is very unusual to find a single superficial gumma; they are almost always multiple, and a large number of them may be found on the surface of the tongue.

In the course of time they break, and, before doing so, grow redder, softer, and more prominent, or perhaps assume a yellowish colour. They may, however, remain for a long time unbroken, continuing in some persons for many weeks or months unchanged; but this is more usual in deep than superficial gummata. The ulcers, which are produced by the breaking of the little lumps, are similar in character to those which are produced by the breaking of the larger masses, but their depth depends naturally on the depth at which the gumma lies, and the very superficial gummata are apt, in breaking, to destroy, proportionately, a much larger area of the mucous membrane than the deeper tumours, and therefore to present a less apparent depth.

The *diagnosis* of the superficial gummata is not so difficult as of the deep masses. They are so much more commonly multiple than single; they are often situated in parts of the surface of the tongue which are not easily irritated; they tend to break down at an early period; and they are so frequently accompanied by other signs of syphilis that they are generally easily recognised. A single small superficial gumma, especially if it is situated on the border of the tongue, may be more difficult to diagnose; it may be mistaken for a carcinoma in a very early stage, when it has scarcely yet become a cancer, and is rather in the pre-cancerous stage. If there is a rough tooth opposite the little tumour, the diagnosis can hardly be made in the absence of a history or other signs of syphilis. But the real nature will soon appear on removal of the tooth and the administration of iodide of potassium.

The *deep*, or *parenchymatous gummata* are usually much more formidable affections, more difficult to diagnose, and much more destructive than the superficial, unless the latter are very numerous. They may occur in any part of the muscular substance of the tongue, but tend almost exclusively to the dorsal aspect, whether they are situated near the borders or towards the middle line. They occur as often at or near the borders as near the middle line, although they are generally said to affect the central parts of the tongue. They attack, for the most part, men, and rather men at or about the middle period of life; but they are met with in women as

well as men, and are not unknown in children, for they may result from congenital syphilis. They have even been met with in the tongues of infants, but very rarely. Deep gummata vary very much in size. They may be quite small, or they may attain the size of a nut, or even a small walnut; but the very large gummatous masses are generally the result of the conglomeration of several gummata. Although they may vary thus in size, large size is the rule, small size (such as the size of the superficial gummata) the exception. They may lie at almost any depth in the substance of the tongue, and when they are very deep, are scarcely appreciable to sight, as they form only a slight bulge or rounding of the dorsum. But they can be felt as rounded or oval tumours, not very clearly defined, feeling almost like a foreign body in the substance of the muscle surrounded by a layer of inflamed tissue. They are also very indolent, producing very little or no spontaneous pain, and are not usually tender when handled. The mucous membrane covering them is unchanged, unless they are threatening to break. Such gummata may be single or multiple. Perhaps multiple gummata are rather more frequent than single gummata; and when they are multiple, the tumours may be either separate, and lie far apart, or may be close together. They may, as has been stated, become conglomerate, and so produce very large, irregular masses. The natural tendency of gummata, whether superficial or deep-seated, is to break and produce ulcers; but they may remain a very long time unbroken. It is not unusual for the deep gummata to remain un ulcerated for several months, and cases are on record in which they have remained unbroken for several or many years. It has been said by Fairlie Clarke that they may become calcareous, and remain quiescent for an interminable period; but the evidence on which this statement rests appears to be extremely slender; hardly more, in fact, than that there are two or three cases recorded in old books of calcareous masses which were removed from the substance of the tongue, and were certainly not salivary calculi.

The more superficial of the deep gummata project as prominent rounded masses on the surface of the tongue, almost invariably on the dorsal surface (Plate VII., Fig. 1).

Their characters are similar to those of the deeper tumours, but their limits are easier to define, and their hardness is more evident. The mucous membrane over them is generally smooth, and if they are very near the surface of the papillary area, is often devoid of papillæ. But unless the tumour is softening the colour is not usually changed.

In the progress of the disease the tumours become softer, and approach more nearly to the surface. They still retain their rounded or oval form. They enlarge, and the mucous membrane becomes smoother and redder over them, and sometimes they become tender, but very seldom painful, before they break. Fluctuation may sometimes be plainly detected in the larger tumours.

The mere presence of one or more gummata may be the cause of general swelling of the whole or a large part of the tongue, when the tumours press upon the main vein. And when several gummata co-exist in close proximity, and produce a large tumour, the tongue may be very greatly swollen, especially when the tumours are making their way towards the surface, and are about to become fluid. Instances are on record in which the tongue has attained so large a size as the result of the presence of gummata that it could not be contained within the mouth, but hung out, like it does in macroglossia. Such a condition is extremely rare; for in the very large majority of cases the natural textures of the tongue are only affected in the immediate neighbourhood of the tumours. When it is observed, it is almost always due to the presence of a large number of gummata in all parts of the tongue, and to their confluence, so that the whole tongue is distorted and enlarged by being stuffed with syphilitic tumours.

The *diagnosis* of deep gummata may be so clear that it is impossible to be mistaken in it; and, on the other hand, it may be so difficult that it may be quite impossible to arrive at a correct conclusion. The two conditions which are most likely to be mistaken for gummata are innocent tumours, such as fatty and fibrous tumours, and carcinoma, especially in the early or pre-cancerous stage. The innocent tumours are very often polypoid; gummata are never so. Innocent tumours are almost always clearly defined, elastic, separate

from the natural structures of the tongue; gummata are usually less sharply defined, are indolent and inelastic, and are not separate from the surrounding textures. Innocent tumours are more often single, gummata more often multiple. Innocent tumours are sometimes lobulated; gummata are never lobulated, although a false aspect of lobulation may be given to a gumma by the close proximity of two or more of them. A cancerous lump may be distinguished from an unbroken gumma by the fact that the cancerous lump is almost invariably single, the gumma more often multiple. The cancer very often forms opposite, and as the result of the irritation of, a carious tooth; the gumma has no connection with bad teeth. The cancer more often occurs at the borders of the tongue; the gumma as often affects the middle parts. The cancer usually is a disease of persons more than forty years of age; the gumma is frequently observed in persons between twenty-five and thirty-five years old. In all doubtful cases the presence of other signs of syphilis, past or present, must be carefully sought for, and the history of syphilis inquired for.

A gumma may be mistaken for a chronic abscess, but the abscess is usually more clearly defined than the gumma, and has a more distinctly rounded shape. Unless, however, there are associated signs of syphilis, it is probable that the diagnosis will not be certainly made without puncturing the tumour, or testing the effect of iodide of potassium.

Again, it is possible that a gumma may be mistaken for a foreign body, or, more probably, a foreign body may be taken for a gumma. The history of an accident, and the long continuance of the tumour in an unaltered condition, together with the absence of history and signs of syphilis, are the conditions on which the diagnosis will depend. The question is one that will not often arise, for foreign bodies are very rarely embedded in the substance of the tongue.

The *prognosis* of an unbroken gumma is almost always good if the case is treated before the gumma has begun to soften, and if the condition of the patient is even fairly good. Under the influence of iodide of potassium, especially if administered in large doses, the tumour usually rapidly subsides. And if to iodide of potassium and other anti-syphilitic

remedies there are added, in cases where the patient is debilitated, tonics, the prospect of curing the disease without ulceration is decidedly favourable. On the other hand, an untreated gumma will almost certainly break down in the course of a few weeks or months, and the extent of the ulceration and its kind will depend largely upon the general state of the patient's health. Multiple gummata only render the prognosis more grave when ulceration takes place; they yield as readily to treatment as a single gumma. And even the great swollen tongues which are sometimes met with, overloaded with gummata, and enlarged in all directions, usually subside rapidly under appropriate treatment.

Nodes and nodules, which occur as the result of past syphilis, are, in truth, nothing more than prominent areas of the tissues of the tongue, which are, as it were, squeezed up on the dorsum and borders of the tongue by the contraction of tracts of fibroid tissue between and around them. They are of very irregular shape and size, sometimes quadrilateral, of tolerably equal size, and not much raised, rather mamillary in their aspect. But in some tongues they are of large size, rounded, looking like great tubers, or like large projecting gummata. Since the furrows and fissures more often run along the long axis of the dorsum, the tubers or nodes are often elongated, rather interrupted ridges and folds than a series of nodes (Plate II., Figs. 1 and 2). The mucous membrane over these elevations of past syphilis is generally smooth, and may be of normal redness, but is more often redder than natural, sometimes ulcerated or excoriated. The consistence of the lumps is firmer far than of the normal tongue, but varies according to the degree of tension around them, and according to their actual condition at the time of examination. If there is accidental inflammation, they are harder than at other times. It must not be forgotten that, although these are described as the results of past syphilis, they may be associated with fresh outbreaks of syphilis, and gummata, or new tracts of embryonic tissue, may be developed in any part of the diseased tongue. By this means the character of the elevations, and, indeed, of the entire tongue, may be modified.

The nodules may be numerous and small, mere dots,

feeling hard to the touch (Hutchinson). Stewart saw nodules the size of the circumvallate papillæ covering the back of the tongue and inner side of the cheek. They had existed three years and were the only manifestation the patient had had since a chancre thirty years before. They all disappeared under iodide.

The *diagnosis* of these old syphilitic tongues usually admits of no question. The scarring and consequent fissures, the unequal elevations over much or the whole of the surface of the tongue, the disfigurement due to the combination of the two conditions, are not found in any other disease, or as the result of any disease other than syphilis. Chronic inflammation may produce some deformity of the dorsum of the tongue, but never the deep and indelible furrows of syphilis, and the bosses, ridges, and nodes between them.

These old tertiary tongues are incurable, so far as the removal of the disfigurement is concerned; but much may be done to allay the irritability of the tongue, to lessen its liability to recurrent inflammations, and to relieve the distress occasioned by excoriation and ulceration of the surface of the elevations.

The *treatment* of the different syphilitic nodes and nodules will be almost entirely constitutional for the gummata, chiefly local for the elevations which have been just described. Taking the local measures first, they are such as are described as suitable for cases of leucoma and chronic superficial glossitis (p. 135); and the diet and hygienic arrangements are the same for all these conditions. The chief danger is of recurrent attacks of inflammation. Non-irritating diet and soothing applications are, above all things, to be recommended.

Constitutional treatment of old, scarred, and disfigured tongues is, as has been said, scarcely ever of use, unless there is a renewed outbreak of syphilis, when iodide of potassium and mercury must be administered. Gummata are singularly amenable to the influence of iodide of potassium, and this is accordingly the drug which is employed most largely in treating them. It may be given in doses of five to ten grains; but if an effect is not speedily produced on the tumours, the dose should be increased to fifteen, twenty, or even a greater

number of grains, three times daily. With the iodide of potassium tonics may be advantageously combined, and in broken-down constitutions cod-liver oil is very useful, given in doses of one or two drachms twice a day.

Mercury is useful in two classes of patients suffering from gummata: those who cannot take iodide of potassium, and those in whom the gummata have appeared early in the course of syphilis, and who have not been treated systematically with mercury in the earlier stages of the disease. The very large majority of persons bear iodide of potassium well, even in the largest doses, but occasionally one meets with patients who are iodised by doses of three to five grains, in whom, therefore, it is impossible to push the drug. To these patients a solution of bichloride of mercury may be given in doses of half a drachm to a drachm or a drachm and a half; or mercury and chalk, in doses of one to three grains, may be administered, according as they are feeble or apparently in good health. With either form of mercury, to the feeble and broken down, tonics and good food should be given, for the success of treatment will depend largely on the patient's general condition. The treatment, in such cases, if the patient will submit to it, should be continued over many months or more than a year; the form of the mercury may be changed, but mercury in some form should be administered.

Lastly, mercury may often advantageously be combined with iodide of potassium, in the proportion of half a drachm or a drachm of the solution of the bichloride to five grains of the iodide, in cases in which large doses of iodide of potassium cannot be tolerated, but doses of a few grains are easily borne.

Usually unbroken gummata require no local treatment: they disappear as if by magic under the influence of internal remedies and an improved condition of the health. It has, however, been recommended that a ball of blue pill should be rubbed over the surface of the swellings daily. Bryant suggests that gummata, when they fluctuate, should be opened, but if this is ever done, it should certainly be delayed until a sufficiently long course of internal remedies has been tried, for it is surprising how even the soft and appar-

ently fluid gummata are sometimes influenced by iodide of potassium.

(e) *Syphilitic Fissures*.—Syphilis is a much more common cause of fissures than any other, and the fissures occur for the most part in the tertiary period of the disease, although their occurrence is not limited to it. The fissures of *secondary syphilis* are formed almost always on the borders of the tongue, and are due almost as much to the rubbing of the teeth as to the syphilis. One of the conditions most frequently observed is that in which a mucous patch is developed on the border of the tongue, and being pressed on, or rather into, by the teeth against which it projects, ulcerates. The ulcer is linear or stellate, and gradually deepening, owing to the continuance of the pressure which first produced it, becomes by-and-by a deep and foul fissure. Any other swelling of the border of the tongue might lead to similar ulceration and fissuring; but it is more than probable that the syphilis acts as a powerful predisposing cause.

In secondary syphilis, too, it is not uncommon to meet with cases in which, without the development of mucous patches, the margins of the tongue are in many places ulcerated and sometimes deeply fissured, and this condition also is due in great part to the rubbing of the teeth against a tongue which is predisposed to inflame and ulcerate. These sores and fissures are scarcely at all inflamed, and are not angry, like the sores and fissures which are produced in persons out of health, but who are not syphilitic. In spite of the absence of a red areola, and the signs of inflammation, these cracks and fissures are usually very sensitive, and from the constant movement of the tongue, and the continual irritation to which they are subjected, are a source of great annoyance to the patient. The syphilitic fissures are generally easily recognised by the signs to which attention has been directed, the absence of the active symptoms of inflammation, the presence of numerous sores and fissures, and by the frequency with which they are associated with other signs of syphilis, either upon the tongue, cheeks, and lips, or in other parts of the body. The fissures which are formed in mucous patches are still more easy to diagnose; for although the aspect of the patch is greatly changed by the ulceration,

it can be generally discerned for what it is, and is very often accompanied by other tubercles upon the sides or dorsum of the tongue. They will be distinguished from the single tuberculous fissures by the absence of the signs already noted for that lesion.

The *treatment* of these secondary fissures is usually very successful. Unless they are produced by the irritation of very carious and jagged teeth, the removal of the neighbouring teeth is not necessary. The internal administration of mercury, and the general constitutional treatment advisable for secondary syphilis, with, above all, the external application with a camel-hair brush of a ten-grain solution of chromic acid, heal them with the greatest rapidity. They cease almost immediately to be so sensitive, and in less than a week are, for the most part, scarred over. As is pointed out in the chapter on ulcers, the internal administration of anti-syphilitic remedies may not remove these secondary affections of the tongue unless the treatment is continued during many weeks or months, but the external application cures them with the greatest rapidity. If a solitary deep fissure on the border of the tongue of a syphilitic person is distinctly associated with the presence of a rough and jagged tooth, the cure of the fissure will not be effected without removing the carious tooth.

The healing of secondary syphilitic fissures is followed by *scarring*, and the scars are usually depressed and smooth, but they not infrequently become thickened and raised in milk-white lines and patches, which are very characteristic of past syphilis, and which may break down in later life with the production of new sores and fissures. These later manifestations, to which one feels inclined to give the name of secondary, although they appear long after the period of secondary syphilis is passed, are amenable to the same treatment as when they first broke out. Mercury and a solution of chromic acid act on them almost like a charm, and the most obstinate of them disappear under the combined influence of the two remedies. But the scars, both of the first and of the second outbreak, are permanent, and may break down again.

The fissures of *tertiary* syphilis are usually much more

formidable than those of the secondary period. They may occur as the result of several slightly different pathological conditions, and are apt to vary, according to the nature of the condition which precedes them. Take as examples the following cases, three in number, all of which were under care at St. Bartholomew's Hospital. A man about forty years of age presents himself in the out-patient room with the complaint that within the last week or ten days something has broken in the back part of his tongue, and when the tongue is protruded, there is a great and very deep fissure in the middle of its back part, about two inches in length. The edges of the fissure are drawn apart, and its depth is found to be at least an inch; the sides are ragged and partly covered with slough; the edges are a little undermined, and the surrounding tissues are very slightly swollen and sodden, but very little indurated. There is a history of syphilis many years ago, and there are scars of past sores and thickening of the front aspect of each tibia. There can be no doubt that the fissure is the result of the breaking of a large gumma, or of a collection of gummata. He is put on iodide of potassium, and the sore is simply cleansed as often as he can manage it with Condy's lotion, and, when it flags in healing, with an astringent solution. The healing is steady, but is very slow, and it is long before the fissure is obliterated. A scar remains, not corresponding with the depth of the great cleft, for the two sides joined together over a part of their extent, but still quite deep enough to be easily seen when the tongue is protruded.

The second patient was a woman, who was for a while an inmate of Sir Thomas Smith's wards. She was younger than the man, for she was not more than two-and-thirty. She was well-looking, and bore no marks of syphilis unless upon her tongue, but there was no attempt to conceal the fact that she had suffered some years earlier from the disease. Deeply grooving the dorsal aspect of her tongue were two long and sinuous fissures, each from an inch and a half to two inches in length, or even longer. Each fissure branched here and there, and thus bore the appearance of a river on a map, with its tributaries joining it at intervals. When she protruded the tongue it was not difficult to see

into some parts of both the fissures, for their edges separated, and allowed the deeper parts to be discovered, and then it was seen that they were at least a third of an inch deep, and in some parts deeper, a great depth when the extremely short diameter of the cleft is taken into account. The sides of the clefts were either quite perpendicular or a little undermined, and were not ragged and sloughy, as in the last case, but smooth and glazed, here and there redder and more sensitive; and often at the bottom of the fissure could be seen coagulated discharge or decomposing food. The parts of the fissures which could not be perceived by the natural separation or falling apart of the sides could easily be brought into view by gently separating them with the fingers. There was a little swelling and a very little induration of the borders of both fissures, and a narrow area immediately about them of smooth glazed dorsum, and beyond this the dorsum of the tongue was natural, and covered with papillæ and with fur. The patient suffered exceedingly, for although there was no inflammation of the tongue, it was extremely sensitive, and there was profuse salivation. During her stay in the hospital she made very little progress towards recovery, for she could not take iodide of potassium, on account of the iodism which it almost immediately produced, and none of the local applications which were ordered appeared to alleviate her suffering. Before she returned home she began to recover under small doses of the solution of bichloride of mercury and the local insufflation of a powder composed of morphia and oxide of zinc.

The third patient was also a woman, about fifty years of age, who had had a very bad tongue for many years, and in whom the trouble recurred from time to time. Her whole tongue was strangely altered and disfigured; long furrows and deep fissures ran down the dorsum from far back almost to the tip, and more than half-way back were crossed by similar fissures, extending nearly quite across the tongue. In front of and behind these transverse lines there were other transverse fissures, less deep and long, merely producing a puckering of the tongue, instead of appearing almost to cut the tongue across. The sides of

the fissures were quite smooth and covered with unbroken mucous membrane; nor was there any ulceration at the bottom of them. Between them the substance of the tongue bulged forth in smooth red masses, forming longitudinal rolls, which were broken and puckered by the smaller transverse fissures. There were no papillæ or fur upon them, but the most central of them were roughened and warty. She was annoyed by frequent excoriation and ulceration of the prominent portions, which protruded between the fissures, but the fissures themselves seldom gave her any trouble. In her case treatment was directed solely to relieve the transient disturbance of the surface, for it was obviously impossible to remedy the general disfigurement (Plate II., Fig. 2).

It is important to bear in mind that the lymphatic glands are very seldom enlarged in association with syphilitic fissures, of whatever kind. Occasionally enlargement of one or more glands occurs, but the enlargement is almost invariably due to some accidental cause.

It is very unusual for a tertiary syphilitic fissure *to be mistaken for any other disease* than syphilis. It is so very rare to meet with deep and long fissures from other causes. Fissures, certainly, are formed in some cases of carcinoma, and sometimes in tuberculous disease of the tongue, but there is seldom any difficulty in distinguishing between these different fissures. Carcinoma does not appear in the first instance as a long, sinuous fissure or a deep and ragged cleft of the tongue. There is, in almost every case in which clefts occur, a distinct tumour, and the fissures are clefts in the substance of the tumour, which is not uncommonly a large, more or less prominent, ulcerated mass. It is evident, at the first sight, that the disease is a malignant disease, and not a mere fissured condition of the surface of the tongue. Tuberculous disease might possibly be mistaken for syphilitic disease in a very few rare cases. Such a great ulcerated cleft as that described in the first case is occasionally formed in tuberculous disease, but it is not until the disease is very far advanced and the signs of tubercle of other organs are clearly apparent. The tuberculous fissure is generally small, not long or generally deep, at

first single, and bearing such characters as are described in the section on tuberculous ulcers. The associated signs, if there are any, are widely different in the two diseases, and the tongue is seldom without some other signs in the case of tertiary syphilitic fissures.

The *treatment* of tertiary fissures of the tongue is guided by the rules which prevail in the treatment of tertiary affections generally.

In addition to the general treatment of the case, the healing of the fissures may be often hastened by local measures, or if not materially hastened, may be rendered much more durable by the patient. The use of chlorate of potash in the form of gargles of various strengths will probably suggest itself to most persons, and some patients are very much relieved by it. Borax-and-honey is also painted on the sore parts of the fissures with decided benefit. But there are other local remedies which are much more efficacious than these. In some persons glycerine of borax and glycerine of tannin, either of the Pharmacopeial strengths or diluted to a greater or less degree, produce a rapid improvement in the condition of the sores. Other persons are more certainly and speedily relieved, and their sores healed, by the use of gargles of black wash, either pure or diluted with liquor calcis. And in other cases, the application of weak solutions of the bicyanide of mercury with a soft brush at frequent intervals (three or four times a day), or in much stronger solutions once in two or three days, produces an excellent effect on the condition of the tongue. But the local applications from which the greatest benefit is derived are powders blown on the tongue, just as they are blown into the pharynx or larynx through an insufflator, or ointments applied in the manner described on p. 137, Chapter VIII. Pure iodoform, or iodoform and borax in various proportions, are excellent for the powders; and if there is great sensibility of the affected part of the tongue, small quantities of morphia, from the twelfth to the sixth or more of a grain, may be added to each powder. The manner of employing these powders and other points connected with them are mentioned in the chapter on the palliative treatment of cancer and in the

chapter on ulcers, but it will not be amiss to direct attention in this place to the necessity for cleansing, as far as is practicable, the surface of the fissure before the application of the powder. This precaution ought, indeed, to be taken before any local application is made, otherwise the remedy does not reach the actual sore surface. Fissures especially require careful cleansing, on account of their depth and the tendency of food and other matters to collect in them. When the tongue is protruded and held gently out by means of a soft rag, the sides of the fissures often separate naturally, or if they do not, may be easily separated by pressing them gently asunder with the fingers. A stream of warm water, with a little Condy's fluid in it, should be allowed to fall very gently into the fissure from a syringe, or through an irrigator tube furnished with a nozzle. The stream clears out the material which has collected, and the surface of the fissure is clean, but it is still wet. It should be dried with a pellet of absorbent cotton-wool or with a tiny roll of blotting-paper, and then, while its sides are still separated and its deepest parts are exposed as thoroughly as possible, the powder should be dropped or blown into every part of it. The lack of these precautions is a great reason of the want of success which attends the use of many local remedies which otherwise might be of the greatest service.

The same attention to diet which is paid in the case of other painful or sensitive conditions of the tongue should be paid here.

(f) *Syphilitic Ulcers*.—The ulcers of *secondary syphilis* are chiefly, if not wholly, of two kinds: those which result from the breaking down or injury of mucous patches, and mere abrasions, or cracks, or fissured ulcers on the tip and borders. Many of the latter class are due to the ulceration of mucous patches, but some of them appear, at least, to have a different origin—for instance, in the rubbing or bites of the teeth. The secondary ulcers, which are due to the breaking down of *mucous patches*, are generally easily recognised. They are seated on the tip or borders of the tongue; not because mucous patches are limited to these parts, but because the patches which are developed there are exposed to the rubbing and injury of the teeth, the more so that they widen or

elongate the tongue at the part on which they stand, even though very slightly, and are thus pressed upon the adjacent teeth. The entire patch is not usually destroyed by the ulceration, but a part, sometimes a large part, of it remains to prove the origin of the disease. Usually the central part breaks down, and a starred or long, sinuous, ulcerated crack is produced, with pearly-white, rounded, smooth borders formed by the surrounding mucous patch. Beyond the pearly-white border, which is raised to the extent of half a line to a line, there is a red areola, narrow, and fading gradually into the natural colour of the tongue (Plate IV., Fig. 1). If the irritation is continued, and if the patient is of naturally feeble constitution, especially if he is strumous, the ulcer quickly extends, both widely and deeply, and ulcers are occasionally seen with the superficial area of a horse-bean, and a depth of a third of an inch, or with a much greater superficial area, but a much less depth. The deeper ulcers have a very unhealthy aspect; their edges are sharp-cut, fissured, precipitous, and even undermined; their surface is irregular, without healthy granulations, sometimes covered with slough; the surrounding parts are infiltrated, but rarely much harder than the natural consistence of the tongue. It is worthy of note that these ulcers, however they are produced, are very seldom much inflamed. Even when they are distinctly due to irritation or injury, the inflammation is insignificant compared with that which is associated with ulcers produced by the same kind of irritation or injury in a person who has not had syphilis. We are speaking now of the general rule, but it would not be safe to deny the syphilitic predisposition in every instance in which an ulcer of the tongue is much inflamed, for the presence of syphilis does not afford an immunity from acute inflammation, whether of a part of the body actually syphilitic or not. Acute inflammation is evidently not, however, a necessary factor in the production of even deep and ugly sores upon the tongues of persons with secondary syphilis.

The secondary affections of the *second variety* appear in the form of small excoriations of the dorsum of the tongue, generally near the tip and edges, or of the tip and edges

themselves, without any very definite characters, without inflammation, and often without any signs by which they can be recognised as due to syphilis or any other constitutional malady. They appear also in the form of small cracks or fissured ulcers on the tip and borders of the tongue, and these, again, are chiefly noticeable for the absence of any distinctive characters and of surrounding inflammation. Sometimes the disease of the tongue is limited to one or two cracks or excoriations; sometimes the borders are affected in every part; but in neither case is there any essential difference in the appearance of the sores. It is very unusual to find these cracks and fissures on the dorsum, a fact which speaks strongly for the necessity of another cause than syphilis at work in their production. Syphilis is the predisposing, the rubbing by the teeth the exciting cause.

The ulcers of secondary syphilis may remain a long while unaltered, or may slowly extend. Whether they are due to the breaking down of mucous patches or not, and whether they are inflamed or not, they are almost always sensitive, often extremely so. This, and the small tendency they show to spontaneous improvement, make the patients who suffer from them very uneasy. Apart from the actual distress they cause, they are in many cases a continual remembrancer of the syphilis to which they owed their origin. On these various accounts patients are most anxious to be rid of them.

The *diagnosis* of these various secondary syphilitic sores is in most instances easy, in some instances almost impossible. Those which are due to the breaking down of mucous tubercles are easily recognised by the remains of the ulcerated tubercles, and by the other signs of syphilis which are almost invariably present on the tongue or some other part of the mucous membrane of the mouth. If the mouth is otherwise free from syphilis, it is more than probable that mucous tubercles will be found around the anus, or nodes upon the tibia, or inflammation of the iris. The entire absence, or the very modified character of the surrounding inflammation, may be almost termed a sign of syphilis; and, in some cases, at least, a history of syphilis will be obtained, and there will still be induration of the penis or soreness where the initial lesion of syphilis appeared. The diagnosis of the excoriations,

cracks, and fissured ulcers which are not preceded or accompanied by the presence of mucous tubercles, or any other marked sign of syphilis on the tongue, is more or less difficult according as there is or is not a clear history of syphilis or symptoms of present or past syphilis in the mouth or some other part of the body. It has already been stated that the characters presented by these lesions are not distinctive of syphilis; but the occurrence of several or many of them on the tongue, and the almost entire absence of surrounding inflammation, are very suggestive of syphilis, especially if the teeth are not manifestly diseased. In some instances the diagnosis is made rather by the absence of the signs of other disease, and by the obstinacy of the affection, than by the positive signs of syphilis.

The *treatment* of these secondary affections is, fortunately, for the most part, very rapidly successful. But to obtain a rapid success it is absolutely necessary, in the very large majority of cases, to use local as well as constitutional measures. If these ulcers occur in the early period of secondary syphilis, or if they occur in persons who have not been treated sufficiently with mercury (in fact, in the large majority of cases), three grains of hydrargyrum-cum-cretâ should be taken twice a day, and the sore places on the tongue should be painted at least three or four times a day with a camel-hair brush dipped in a solution of ten grains of chromic acid to one ounce of water. The effect of this treatment on the ulcers is marvellous: they cease almost at once to be painful, and in the course of a few days most of them are well. Of all local applications for secondary affections of the tongue, none appears to produce nearly so salutary an effect as chromic acid.

The healing of most of the secondary ulcers leaves *scars*, but the scars are seldom very deep or extensive. Still, they are plainly visible, smooth and shining marks, of silvery or leaden hue, slightly depressed, taking the form of the furrows, lines, and cracks of the ulcers. The margins of the tongue are in this manner often puckered and roughened, and changed in colour, affording a permanent record of past syphilis, which is not without use in the diagnosis of later affections of the tongue.

The ulcers due to *tertiary* syphilis are far more formidable than those of the secondary period, and, no matter whether they be superficial or deep, are apt to leave behind enduring records of their passage in the form of deep furrows and extensive puckering. They are nearly always preceded by gummata, but the gummata may be overlooked even when they have probably existed some considerable time, and have been of large size, for they are not usually painful, and are not sources of inconvenience in eating or in speaking (*see nodes and nodules*). An example of the extent of some tertiary ulcers is seen in Plate IV., Fig. 3. It might fairly, having respect to the size of the tongue, have been described as a vast and deep cavity, for it was at least three-quarters of an inch deep; yet the patient declared it had not been preceded by the formation of a tumour, but that a slight swelling had appeared almost suddenly a week before, and that it no sooner appeared than, with little or no distress or pain, it burst, leaving the cavity which he exhibited.

The deep and large gummata produce, in breaking, ulcers which look formidable, but they are in reality often less so than those left by the superficial gummata or the small and numerous gummata, which are more deeply placed. When a large gumma softens and discharges, it usually opens through a comparatively small opening, but the opening quickly enlarges by melting down of the infiltrated and unhealthy tissues immediately around it (Plate IV., Fig. 2). A cavity is exposed, with precipitous, ragged borders, which are often undermined, with a ragged and sloughy surface, with perhaps, but not always, a large slough in its interior, with thickened and generally hardened tissues for some distance around it. It may vary much in shape, may be angular, or cleft-like, or quite irregular, but very rarely exhibits the typical rounded shape of a gummatous ulcer of other parts of the body. After a while the sloughy and ragged appearance of the walls and surface disappears; it is replaced by a smooth surface, with few or imperfect granulations; the surrounding parts remain for a long time thickened and indurated, and the appearance of the disease is that of an indolent and chronic ulcer.

The *diagnosis* of gummatous ulcers is beset with great

difficulties in certain cases, particularly when there is a single ulcer : they may be taken for tuberculous and cancerous ulcers ; and it is not always easy to be sure whether an ulcer is due to the destruction of a gumma or to the injury of a tooth. It will suffice to point out here that all tertiary affections of the tongue have as great a liking for the dorsum as for any other part, and not infrequently occur far back in the middle of the dorsum ; and in this respect they differ from all the ulcers for which they are liable to be mistaken. They may also form in the floor of the mouth, beneath the fore part of the tongue. Gummatous ulcers are much more common in men than women, and attack persons who are at or about the middle period of life, but they may occur much earlier, and have been observed, though rarely, in the tongues of children as the result of inherited syphilis. Associated signs of syphilis may be observed in persons who have gummatous ulcers, if not in the tongue, yet in another part of the body. But the presence of associated signs cannot be relied on, and the history is often quite misleading. The lymphatic glands are not affected in association with gummatous ulcers.

Gummatous ulcers may heal spontaneously, but they rarely do so. They may remain in an indolent condition for an almost unlimited period, neither extending materially nor healing, unless it be over a small area here and there. They may become inflamed and slowly extend, or may become phagedenic, and, quickly increasing, may eat away a large portion of the tongue. The course which they pursue will depend very much on the condition of the patient, and, to a less degree, on the local conditions which surround the ulcers. The effect of lowered health upon them is proved, in an inverse manner, by the amelioration which is consequent on improvement of the general health, even though no anti-syphilitic remedies have been employed. The most rapid *cures* are effected by a combination of tonic and anti-syphilitic treatment.

CHAPTER XII.

TUMOURS AND CYSTS OF THE MUCOUS AND SALIVARY GLANDS ; SALIVARY CALCULI.

Hypertrophy : (a) Congenital, (b) Inflammatory.—Tumours.—Obstruction Cysts, or Ranula : (a) Cause, (b) Sublingual, (c) Incisive, (d) Blandin's, (e) Submaxillary, acute, intermittent, and chronic forms—Salivary Calculi.

In Chapter I. a short anatomical description has been given of the four glandular masses below the tongue—the submaxillary, the sublingual, Blandin's, and the incisive gland—also of those scattered masses found on the sides of the dorsum of the tongue, especially in front of the palatoglossal fold. These become the seat of obstruction cysts; calculi form in the ducts, or tumours arise.

1. (a) **Congenital Hypertrophy.**

Braquehaye and Sabrazès have described a case of congenital hypertrophy of the sublingual glands. A boy, aged six, had, when born, a double tumour under the tongue, which increased so as to impede lactation and cause wasting. He had also inguinal and umbilical hernia. A brother had congenital club-foot, and a sister was stillborn with hydranmion. The tumour was excised and found to consist of hypertrophied sublingual gland tissue. There was no marked interstitial inflammatory tissue, nor any blocking of ducts, but it appeared to be a true congenital malformation by excess.

A similar congenital hypertrophy has been seen in Blandin's glands underneath the tip of the tongue. There are two specimens of this in the College of Surgeons' Museum (Nos. A. 2271 and A. 2271a). In each case an anencephalic foetus has, beneath the tip of the tongue, on either side of the middle line, a lobulated tumour, covered by mucous membrane, consisting of glandular masses embedded in

fibro-fatty tissue. Some of the alveoli have formed cysts.

(b) *Inflammatory Hypertrophy*.—It is not uncommon to meet with cases of mumps in which the chief stress of the inflammation falls upon the submaxillary or even the sublingual salivary gland, and there may remain behind, for a time at least, or permanently, a hard swelling due to the increase of interstitial fibrous tissue.

Suppuration in the salivary glands is almost always secondary to the formation of a calculus.

Tuberculous disease has very rarely attacked the submaxillary gland, being due then probably to the existence of some lymphatic gland tissue beneath the capsule and between the lobules of the gland.

2. Salivary Gland Tumours.

The occurrence of tumours in the salivary glands connected with the tongue is undoubtedly rare, much more rare than the similar tumours which grow in the parotid gland. Yet much interest attaches to them, partly on account of their relatively benign characters, partly on account of the difficulty of classifying them owing to their apparently mixed structure, and also as probably accounting for such exceptional tumours as chondromas on the dorsum or edge of the tongue, viz. as tumours growing in an outlying mucous gland.

The difficulty of explaining the structure of these tumours is so great that they have been termed simply "parotid tumours" or "mixed tumours of the parotid," or have been named after the most prominent structure, "adenoma," "chondroma," "angioma," whilst the full description has shown that all these tumours show more than one structure. Recently there has been a tendency to include these mixed tumours under the term "endothelioma," and this proposition has been especially put forward in a long paper by Rudolf Volkmann. Other writers who have followed Volkmann seem mostly inclined to follow his views. Exceptionally true sarcomas and carcinomas commence in these glands and run the malignant course characteristic of these tumours elsewhere.

The benign, mixed tumour, or endothelioma, is thought to commence by proliferation of endothelium in a lymph

space, in the blood capillaries in the case of the vascular tumours. The proliferating endothelial cells from the lymph spaces grow without infiltrating the rest of the salivary gland, which becomes more and more distinctly shut off by a capsule of inflammatory fibrous tissue. As the tumour grows the salivary gland gets spread out and somewhat

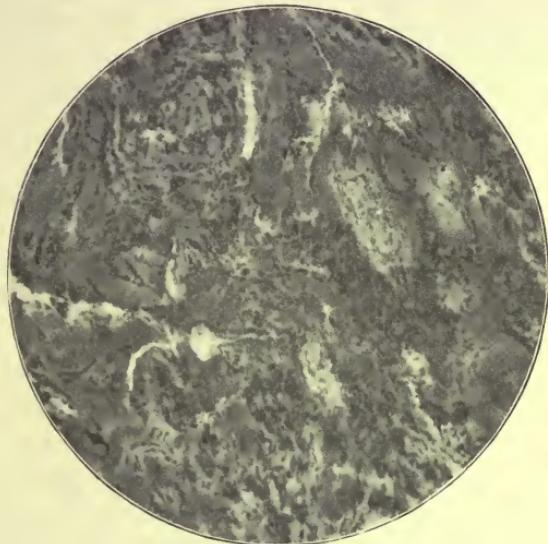


Fig. 14.—SALIVARY GLAND TUMOUR.

Photographed from a section of a salivary gland tumour.

Tubular strands are seen outlined by endothelial cells, the tubes being filled with a hyalin substance. Other parts of the section show spaces lined by endothelial cells, masses of hyalin (so-called cartilaginous) substance, in which the tubular arrangement is obscured; also fibrous tissue. The compressed, otherwise unaltered, submaxillary gland was situated on one side of the tumour.

atrophied, but otherwise undergoes no change, and can always be found. When the tumours are small they appear to shell out from the unaltered gland; when large, the gland is spread out and attached to, but outside, the capsule. Within the capsule the proliferation of endothelial cells gives rise to tubular formations which were formerly mistaken for glandular alveoli, and the tumours consequently named "adenomas." But on more exact observation it has been found that the general arrangement is not the same as that of the glandular alveoli; there is no true lumen and the cells are endothelial in character. The cells of these

tubular strands either secrete a gelatinous substance or degenerate into it, so that this gelatinous substance between the cells was formerly taken for a lumen. By means of this dilatation of an original lymph space, along with proliferation and degeneration of endothelial cells, cysts may be formed. But the cyst is one of new formation and not a dilatation of the original lumen of an alveolus, as formerly taught. The cells may surround themselves with this gelatinous substance of firm texture, which used to be called cartilage; hence the term "chondroma" or "enchondroma" for these tumours. On more careful inspection, it is seen that the substance differs from true hyalin cartilage; it has more of a glistening white appearance, like white of egg, and different micro-chemical reactions. If various sections be examined only part of the tumour will have this cartilaginous appearance, the rest will show various stages of the tubular mass produced by endothelial proliferation, with the gelatinous substance in course of formation. There is no evidence of the occurrence of a pure enchondroma. Sometimes calcification occurs in this gelatinous material.

Endothelium has in the embryo the same origin as connective tissue, and its pathological transition into fibrous tissue or its myxomatous degeneration is easy. Hence some of these tumours have been called "fibromas" or "fibro-adenomas" or "myxomas." On account of the peculiar plexiform arrangement of the cells in strands, with myxomatous and fibrous tissue between, some of these tumours have been named by that exceedingly dubious term "alveolar sarcoma." In some cases the endothelial cells have undergone fatty degeneration, as seen in the specimen from which Waring's drawing was taken. The tumour may, in part at least, consist of a plexus of vessels, hence the term "nævoid tumour" or "teleangioma" or "sarcoma teleangiectodes"; here it is likely that the endothelium of blood capillaries has the chief share in forming the tumour.

To show the difference between the older classification and the one adopted by Rudolf Volkmann, the following table is interesting. He collected forty cases of submaxillary gland tumours, as described by others, and added five cases of his own:—

Older Classification.	Volkmann's Critical Revision.
6 Scirrhous, encephaloid cancer.	None.
6 Epithelial carcinoma.	4 Carcinoma.
2 Simple sarcoma	2 Sarcoma.
6 Enchondroma (pure).	None.
5 Myxochondrosarcoma.	None.
4 Adenoma and adenochondroma.	None.
1 Lymphosarcoma.	None.
15 Endothelioma.	33 Endothelial and mixed tumours.
—	—
45	6 insufficiently described.
—	—
	45

Other views have been held, such as that some of these tumours are cylindromas, produced from the epithelial cells of the alveoli and ducts, whilst the connective tissue outside also takes part in the tumour formation, and undergoes cartilaginous, myxomatous and other degeneration.

Whatever be the pathological explanation of these tumours, they are in most cases clinically benign, malignant sarcomas and carcinomas being much the rarest tumours. They commence generally in the submaxillary gland, to the side and below the tongue, and bulge beneath the jaw. They grow very slowly, taking one to three years to reach the size of a tangerine orange from the time when they were first noticed to be about the size of a nut. They shell out easily, leaving healthy gland substance behind, or if the whole gland is taken away with the tumour it is found spread out over the capsule, but not markedly altered. It is remarkable that these tumours of the submaxillary gland are far more common on the left side. They arise in young adults, in women as often as men, but are also seen in old people. Most important of all, they do not recur after removal, if that takes place whilst they are still encapsulated. Although it is common for the patient to give a history of having noticed the tumour for one to four years, this time may be much extended. Curtis described the case of a woman, aged twenty-four, with a tumour the size of a tangerine orange below the jaw, which had existed eight or nine years. In Lane's case, in which the tumour had existed four years, it was found on removal to be an encapsulated tumour with the

remains of the salivary gland wrapped round it. In Beadle's case of an old woman, aged seventy-six, in which the growth had existed a long time, there was a tumour two inches in diameter, with the submaxillary gland attached. It consisted of myxomatous tissue interspersed with masses of connective tissue cells, without any cartilaginous or glandular appearance.

When these tumours have lasted a good time, especially in old people, they become cystic and may have extravasations of blood in them, and altogether approach the appearance of cystic goitres. Hayes described the post-mortem appearances of a woman who died at the age of seventy-three with an enormous cystic tumour under the jaw which had commenced thirty years before and had grown steadily. It measured fifty inches in circumference, weighed forty-seven pounds, and had partly absorbed the lower jaw by simple pressure atrophy. It could easily have been removed, for it was well encapsuled, and was only adherent to the skin, in which were large veins.

But these tumours do not always remain benign: after remaining indolent for some years a change may set in, extension takes place through the capsule to the surrounding parts, a glandular enlargement commences and spreads down the neck, and death soon follows. If the case is not seen until this change has set in recurrence will probably follow quickly upon removal. We have seen more than one instance of this kind. The rare conditions of teleangioma may present surgical difficulties owing to the number of vessels supplying them. Under the title of angiofibroma Fischer describes a tumour growing for a year and a half in a man aged thirty-seven. It was first noticed under the left jaw, closely connected with the base of the tongue, gradually bulging more and more into the neck, as well as forming a tumour in the mouth. At the time of operation it had grown so as to receive a communicated pulsation from the carotid. An attempt was made to remove the tumour, enormous veins were met with, and the patient died on the table after the operation had lasted an hour and a half.

Diagnosis of Submaxillary Gland Tumours. — The tumours described have generally been met with in the

position of the left submaxillary gland, although perhaps some of the tumours may have grown from adjacent portions of the sublingual. They have generally been first noticed when about the size of a nut, felt by the patient under the angle of the jaw, as a hard nodular tumour, and continuing to grow slowly. Their origin is unconnected with injury or inflammation, and the tumour is single, whereas in lymphatic gland enlargements more than one is generally enlarged, the commencement is inflammatory, or is accounted for by a carious tooth, etc. The tumour is partly movable along with the salivary gland. Removal is always indicated; and, if the tumour is not encapsulated and is difficult to define, it is safe to remove the salivary gland. Even when the tumour is vascular the operation will present no difficulties if undertaken early, the vessels surrounding the tumour being first of all ligatured.

3. Obstruction Cysts of the Mucous and Salivary Glands ; Ranula.—The name “ranula” has some fanciful origin, of which the explanation is lost, and none of the attempts which have been made to supply one has met with general acceptance.

Did the swelling under the tongue seem like the head of a “ranula,” “little frog,” or “tadpole,” the salivary papillæ like its eyes, the fringe on either side of the frænum like its gills?—did the ropy mucus appear to be the mother substance of the swelling, just as the tadpole comes out of the ropy frog spawn? Charles Bell said that a ranula was like a frog’s belly; but others likened it to a frog’s tongue.

The name has proved unfortunate, and the source of much unnecessary confusion. Many totally different conditions have been included under it.

If the word is used, it should be applied to any obstruction cyst of the mucous and salivary glands under the tongue. The different forms of ranula will then correspond to the glands, submaxillary, sublingual, Blandin’s, and the incisive gland, and will vary according as the obstruction is acute, intermittent, or chronic, and according to the direction in which the cyst tends to bulge.

(a) *Cause of the Obstruction.*—The chief cause of the

obstruction appears to be an inflammation taking place within the ducts, giving rise to the formation of plugs of inspissated mucus in which calcareous material may become deposited. Possibly this may be started by micro-organisms passing into the ducts from the mouth, as staphylococci have been found, but no direct connection between inflammatory conditions in the mouth, carious teeth, tartar, etc., has been noted. Nor do inflammations, such as mumps, if the salivary glands are affected, lead to ranula and calculus. Small foreign bodies, bits of grain or husks of corn, fruit seeds, such as those of raspberries and currants, are said to penetrate into the ducts, but this causal connection has but seldom been demonstrated. Tumours pressing on the ducts certainly cause retention. Some ranulas are clearly congenital (Lannelongue), presumably due to malformation of ducts, and perhaps a malformation is a more general cause than is supposed; for although ranula and salivary calculus generally appear in adults, yet they are seen sometimes in children at ages of nine and twelve. The result on the gland behind the obstruction is atrophy with an increased interstitial inflammation. Suzanne says that ranula is a myxomatous degeneration of the gland, and is not due to duct obstruction. Another theory, not widely held, is that a ranula is a cyst of new formation.

(b) *Sublingual Ranula*.—The commonest form of ranula is that which arises in the sublingual gland (Fig. 3, p. 8), and which gives rise secondarily to atrophy of the rest of the gland, and to more or less pressure on the submaxillary or Wharton's duct, but along which it is possible to pass a probe (Baker). It is generally painless in its original course, and rises up in the floor of the mouth between the tongue and the jaw, having a translucent appearance, with large veins on its surface. It is tense and fluctuates, but does not pit on finger pressure; it does not generally bulge in the neck, and cannot therefore well be felt by bimanual palpation. It may enlarge until it pushes up the tongue, and causes difficulty in speech, feeding, and respiration, or bulges almost out of the mouth. When a ranula from protruding in the floor of the mouth projects into the submaxillary region below the angle of the jaw it is probable that it has

originated in the intrabuccal portion of the submaxillary gland, and not in the sublingual. Morestin figures a dissection to show prolongations of sublingual lobules between the fibres of the mylohyoid muscle appearing on the under surface. He conjectures that a ranula may form in this position, and thus be met with between the lower jaw and the hyoid bone below the mylohyoid. A calculus may form in connection with the ranula and suppuration may be set up spontaneously, or as the result of some ineffective tapping: then pain will be caused.

(c) *Ranula in the Position of the Incisive Gland*.—In this position the ranula is just behind the lower jaw (Fig. 3, p. 8) and pushes up the frenum. The origin of such ranulae was at one time assigned to a bursal sac by Fleischmann, but this bursa has no existence (*see* p. 10). It is difficult or impossible to distinguish one arising in the incisive glands from a bilateral ranula of the sublingual gland. Paget describes a congenital cyst which, immediately after birth, was so large as to nearly suffocate the infant; it was, therefore, immediately tapped, and a tumbler of clear watery fluid drawn off. The cyst was tapped twenty times during the first year of life, further treatment was not allowed until the child was aged four. A cyst then hung from the mouth nearly down to the sternum, covered with a harsh dry cuticle approaching that of skin; the muscles of the tongue were spread out over its posterior and upper aspect. The teeth, lower jaw, and lips were all everted. The cyst was removed without difficulty. It contained turbid yellowish fluid, and there was a well-defined wall of fibrous tissue, lined by granulations without trace of epithelium.

(d) *Ranula in Blandin's Gland*.—A more clearly defined form of ranula is met with in Blandin's gland (Fig. 4, p. 9). The tongue can be protruded with the cyst attached underneath its tip, leaving the floor of the mouth free. Von Recklinghausen and Sonnenburg showed by dissection that a ranula occurred in connection with this gland. The case described by Foederl is very clearly a cyst due to congenital obstruction of a duct of Blandin's gland. Immediately after the birth of a fully developed child a transparent, fluctuating, pear-shaped mass was seen, fixed underneath the tip of

the tongue, its upper surface being level and continuous with the dorsal surface. The floor of the mouth and the salivary papillæ were quite free, and saliva was secreted freely from them when sugar or citric acid was put on the tongue. Egg-white-like fluid escaped on cutting into the cyst; an excised portion of the cyst showed columnar cells in places; in others, the cells had been detached and the wall of the cyst was formed by a connective-tissue stroma—evidently the cyst-wall was formed by a dilated duct. In Godlee's case, in which a tumour was cut out from the tip of the tongue, a calculus formed the centre of the tumour, surrounded by glandular substance and round and spindle connective-tissue cells, which were concluded to be sarcomatous. Here a malignant change had commenced around a salivary calculus.

(e) *Ranula of the Submaxillary Salivary Gland.*—According to the position of the obstruction, the duct and intrabuccal portion (Fig. 3, p. 8) of the gland may be affected, or the external part of the gland may become cystic and bulge below the angle of the jaw. Calculi are much more common in connection with Wharton's duct than in the ducts of the other glands.

Acute Form of Ranula.—The obstruction may occur rapidly, and be attended with swelling, and pain and tenderness over the gland below the jaw. There may occur a sudden attack of pain and swelling of the submaxillary gland whilst eating, owing to some congenital or other partial obstruction which, when the saliva is rapidly secreted at the meal, causes acute retention. This acute retention may be also set up by the shifting of a plug of mucus, so that the duct is suddenly blocked—a plug of mucus which may become the nucleus of a future calculus. The pain in connection with this sudden retention may be extreme. French described an acute ranula which formed in a boy of eleven who was eating a very hard apple, and pressed a lump against the floor of the mouth. There was much pain, and a swelling appeared which stopped mastication. The swelling discharged twice, but refilled. It was found to be a dilatation of Wharton's duct, and was cured by a seton. In Richet's case the cause of the acute obstruction was a blade of grass

which had entered the opening of Wharton's duct. Du Cane's case was an extraordinary one. A man in good health was eating his dinner, when suddenly a swelling began to form under the tongue on each side, pushing the tongue backwards until only the under surface of the tip was visible. He became unable to swallow his saliva, and began to suffer from dyspnoea. Two large oval swellings presented, of a pale pinkish colour, with translucent walls, that on the right side causing also a bulging beneath the jaw. Immediately upon incision and the escape of an ounce of saliva on each side, relief was given. There was no calculus or stenosis in Wharton's duct, and the trouble did not recur.

Intermittent Form.—In some cases the distension is intermittent, the discharge by the salivary papilla taking place spontaneously, or being aided by manipulation, the tumour disappearing after the patient has pressed upon it. This is very often due to a small calculus, which is easily movable in the duct, and only causes obstruction when it is arrested just within the orifice.

Chronic Form.—If the obstruction is in the neighbourhood of the salivary papillæ a distension of Wharton's duct will be found with or without any swelling below the angle of the jaw. The tumour has an elongated shape, and there is no flow of saliva from the corresponding salivary papilla when the surface has been dried and the tongue touched with a glass rod dipped in citric acid. A probe cannot be passed along the duct until after a puncture, whenropy saliva escapes. On then inserting a probe, a salivary calculus may or may not be met with. If the retention involves the external portion of the gland, a cystic swelling forms in the submaxillary triangle below the angle of the jaw. It may intermittently subside owing to the communication with the mouth not being entirely shut off, or may continue to enlarge. One of the largest size is described by Sir James Paget. A flaccid, half-filled cyst occupied subcutaneously the side of the face and neck, extending from the malar bone and zygoma to the cricoid cartilage, backwards to the anterior border of the masseter, and forwards to the middle line below the jaw, and nearly to the angle of the mouth. It had existed four years, and had intermittently discharged through

Wharton's duct. The cyst was drained from below, and after free suppuration shrunk to scar tissue, and permanently healed.

4. Salivary Calculi.

A salivary calculus consists chiefly of phosphate of lime, with some carbonate and about 5 per cent. of organic matter. It forms a spindle-shaped concretion, its shape being determined by the duct in which it forms. This is generally the submaxillary duct, but occasionally a calculus is met with in one of the other ducts—*e.g.* that of the gland of Blandin (Fig. 4, p. 9). It apparently forms in connection with a plug of inspissated mucus by the deposition of lime salts; and its commencement and early development being usually painless, it may reach a considerable size without being noticed. It may then cause tenderness on contact, impair mastication and speech, or set up suppuration, and become buried in a fungating mass of granulations or surrounded by a mass of scar tissue. The size reached may be that of an almond, the extreme size reached being in Puzey's case, one and a half by one inch by half-inch, and the weight 7·6 grms.; in Power's case, one inch in length and half-inch in circumference, with a weight of 4·4 grms. The stone may be easily felt through the wall of the duct, which fits it tightly like a glove, and from which it is with difficulty drawn out, owing to the closeness with which the wall of the duct surrounds it. In another form, the duct is distended to form a ranula, and it is only when the fluid has been let out that a stone is found loose in the cavity. Then suppuration sets in, there is much pain, and the pus may be discharged into the mouth or through the skin under the jaw. A fistulous tract forms with fungating granulations, from which a foul discharge escapes. Through the fistulous tract or the granulations the calculus may be felt by a probe or needle. If the stone only excites a slight degree of chronic inflammation, the walls of the duct gradually thicken around it until a hard tumour has arisen, and the stone in the centre escapes detection unless the centre of the mass is explored by a needle.

A rarer form of calculus formation takes place in the secondary ducts of the gland, and calcareous masses like rice grains are formed, which may escape spontaneously

through Wharton's duct; or, when an incision is made into the swelling, many of these small calculi are squeezed out. A case of the kind was seen by Spencer. A maid-servant had suffered much from pain and presented a very tensely distended duct of Wharton on the left side with swelling and tenderness of the gland under the jaw. The duct was incised after applying cocaine, and a number of calculi, like rice grains, squeezed out. There followed several re-collections of the small calculi, and, finally, the gland was excised. The section made from the excised gland shows chronic interstitial inflammation with spheroidal collections of partly calcified mucus in the secondary ducts.

The *diagnosis* of ranula follows from the description: A more or less tense, thin-walled, semi-translucent, fluctuating swelling in the position of one of the mucous salivary glands. The diagnosis of ranula from dermoid cyst has been often dwelt on at length; it is generally very easy. A dermoid cyst is generally more doughy to the touch, is not translucent, and can be felt through the skin behind the lower jaw. A ranula of congenital origin must be distinguished from a congenital cystic hygroma in the neck bulging up towards the floor of the mouth.

A calculus is very difficult to diagnose when it has become surrounded by a mass of firm, fibrous tissue, and when, after suppuration, there has been a bursting of the abscess and the stone lies under a fungating mass of granulations. There are cases in which the presence of a calculus can only be diagnosed by exploring with a needle or by an incision. Küttner mentions five cases in which a tumour of this kind was explored and a calculus found in the midst of a hard, inflammatory mass. In only one of the five had a preliminary diagnosis been correctly made; in the other four, malignant disease was supposed to be present. All three cases described by Hulke gave rise to a suspicion of cancer until the tumour was explored. The neglect of such a preliminary exploration has led to unnecessary excision of portions of the tongue, the tumour proving afterwards to be a calculus surrounded by a mass of dense fibrous tissue. Kappeler describes the removal of a tumour, supposed to be malignant, extending from the

symphysis of the jaw to the hyoid bone, set up by inflammatory thickening around concretions.

The Treatment of Ranula and Salivary Calculus.—Many small and superficial cases are cured by simple measures. A seton may be passed which will cut itself out about the sixth day, leaving the open sac to suppurate and shrivel up. Another method is to excise a piece of the cyst wall and wipe out the cavity with chloride of zinc or nitrate of silver. The inner wall is wiped away or sloughs, and healing follows. Puncture only, as also the injection of iodine, are useless measures. Many cases are not to be cured by such simple means, especially when the sac wall still preserves its mucous surface, and then excision is required; also excision of a ranula is necessary when simpler means have failed. Care must be taken to completely remove the whole wall, for a small piece left behind may keep up a fistulous track. The tumour can almost always be removed from the mouth. The tumour may be dissected out without opening the sac, or a small opening may be made, the contents allowed to escape, and then a piece of sponge is inserted in order to distend the cavity of the cyst and make excision easier by defining the margin. In such cases, a general anæsthetic is required.

Calculi are removed by cutting down upon them freely in the line of the duct and extracting them by forceps and a small scoop. The operation can often be performed with cocaine or under nitrous oxide gas, but a general anæsthetic may be necessary.

An external incision is only called for in order to excise the outer portion of the submaxillary gland. The incision should run well under the ramus of the jaw, and a ligature be placed at the junction with the inner portion of the gland and Wharton's duct in order to avoid a mucous fistula.

CHAPTER XIII.

CYSTS OF THE TONGUE.

Epidermal or Dermoid Cysts and Fistulae—Mucous Cysts—Blood Cysts—Parasitic Cysts: Cysticercus Cellulose and Echinococcus Cysts—Chronic Abscess.

1. Epidermal or Dermoid Cysts.

These cysts were formerly confused with the obstruction cysts of the mucous and salivary glands or ranulae, with the cysts which form in connection with the thyreoglossal tract and with cold abscesses. They are characterised by a lining of stratified epithelium, outside which is a fibrous capsule; there are frequently present appendages of the skin, sebaceous glands, and hair-follicles.

The epithelial lining can always be found on microscopical examination, although it may be obscured, and partly, yet not wholly, destroyed by suppuration. The lining is epidermal; there is frequently little or no evidence of any formation of true dermis, the fibrous wall outside the epithelial layer being of inflammatory origin, but there may be papillæ and more or less evidence of dermis. However, "dermoid" is the common term used.

The contents of these cysts consist of epithelial cells, more or less broken down, sebaceous material secreted from the glands, and often of hair, generally short and downy. The sebaceous material undergoes variations in consistency; it may look like porridge or become of the consistency of white of egg, or become partly crystalline, showing crystals of cholesterol and fatty acids, or become oily, and set after growing cold. The odour is that of the fatty acids which characterise sebaceous cysts.

These cysts, no doubt, have their origin in groups of epithelial cells separated off in the earliest stages of embryonic life, and remaining enclosed ("sequestered") is

the term used by Bland Sutton) in the connective tissues formed by the mesoblast. Groups of epithelial cells, when detached and carried into the connective tissues by injury, give rise to epidermal cysts, such as are met with on the fingers.

The separation of the epithelial cells which will later form the cyst must occur in the very earliest stages of embryonic life, when the layers of the epiderm and endoderm are just beginning to be separated by the mesoblast. The cysts may occur in the middle line from the symphysis of the lower jaw to the body of the hyoid bone in the line of the deeper part of the septum of the tongue. They are connected, therefore, with the closure of the epiderm along the middle line, which will come to lie between the lower jaw and the hyoid bone. They are found along the line of the septum, the origin of which, as the skeleton of the tongue in lower animals, has been referred to, also the fact that the cells which give rise to the primitive bone of the skeleton, *e.g.* of the skull, are a part of the mesoblast most closely connected with the epiderm (Chapter I., p. 10 *et seq.*). A dermoid cyst may have a lateral position, being found below the angle of the jaw, near the cornu of the hyoid bone. In many cases this has been found to be really a secondary position by extension from the middle line. When really primary the cyst, in all probability, originates in connection with a lateral branchial groove.

The evidence that a dermoid cyst is really congenital in origin is often defective. The fact that the cyst is only noticed in adult life, and as late as sixty years of age, may, at first sight, seem to oppose a congenital origin. But there is now ample evidence that a dermoid cyst may remain small and quiescent for an indefinite period. Moreover, in some patients at least, a small lump has been noticed at birth. In Flinn's case a small lump the size of a pea was noted on the second day after birth, lying beneath the tongue, which slowly enlarged to the size of a nut. When the patient reached the age of twenty-eight the tumour again began to grow until it filled the mouth and projected beneath the jaw, having a diameter of five or six inches,

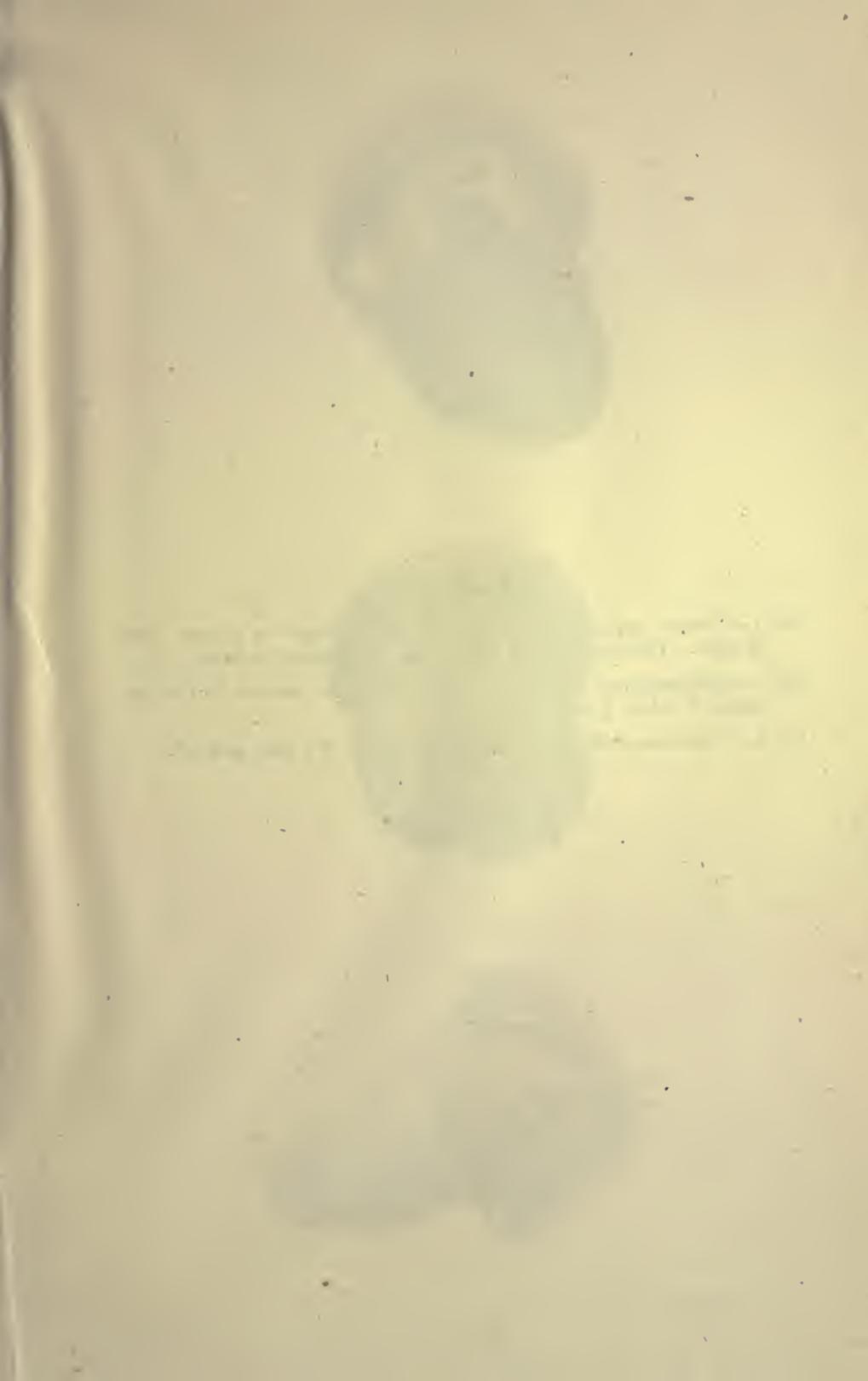


PLATE VII.

Fig. 1.—Tertiary syphilitic plaque of dorsum of tongue in a man, aged 30 years. Two gummata on right border commencing to shrink.

Fig. 2.—Lymphangioma of the whole thickness of the anterior half of the tongue in a boy, 7 years old.

Fig. 3.—Carcinoma of the left border of the tongue of a man, aged 40.



Fig. 1



Fig. 2



Fig. 3

and producing prostration and dyspnœa. In Green's case the cyst was the size of a small bird's egg at ten years of age. At twenty-nine, the man could not close his teeth at all, and only with difficulty his lips, and there was huskiness and dyspnœa. Stephen Paget gives the results of an exact microscopical examination of a dermoid cyst, three-quarters of an inch in diameter, removed from under the tongue of a little girl by Butlin. Its inner surface consisted of true

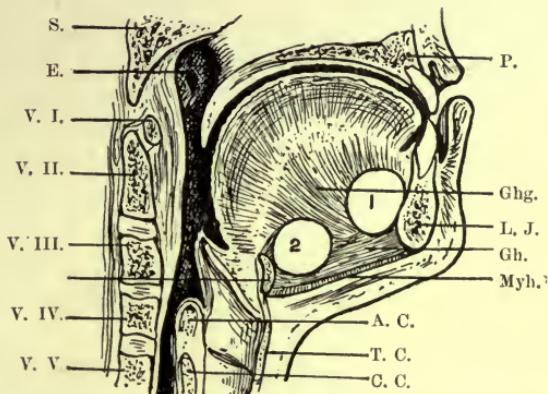


Fig. 15.—DIAGRAM OF A SAGITTAL SECTION THROUGH THE TONGUE.

The diagram serves to indicate the two common situations of (1) and (2) dermoid cysts and also the parts which are involved by compression when such cysts or other tumours of the tongue become much enlarged.

S. Base of Skull. V. I., II., III., IV., V. Level of Altas, Axis and following vertebrae. A. C. Arytenoid Cartilage. T. C. Thyroid Cartilage. C. C. Cricoid Cartilage. Myh. Mylohyoid. Gh. Geniohyoid. Ghg. Geniohyoglossus. E. Eustachian tube. P. Hard and soft palate. L. J. Lower Jaw.

skin with a few short hairs. The papillæ of the corium and the part of the corium lying immediately under the rête malpighii was loaded with black pigment, whilst the rête malpighii itself was free from pigment. It is curious to note that the skin under the chin of the girl would be the seat neither of pigmentation nor of hair-follicles.

A dermoid cyst is usually situated in the middle line beneath the main substance of the tongue, between the geniohyoglossi muscles and above the mylohyoid. Usually, when the case is presented for operation, the tumour bulges beneath the chin, and may be of the size of a pullet's egg, turkey's egg, or even that of the closed fist. The cyst is generally (Fig. 15) attached by a firm, fibrous

band to the lower jaw, about the genial tubercles, or to the body of the hyoid bone, but it may have no attachment to either the one or the other. An instance of this is to be seen in the College of Surgeons' Museum (No. 252): the cyst lies in the middle line beneath the main mass of the tongue, between the geniohyoglossi muscles; its contents resemble the hard-boiled yolk of an egg, and the cyst is lined by squamous epithelium. If the cyst bulges into the floor of the mouth it has a yellowish or orange aspect, as distinguished from the bluish look of a ranula. If examined bi-manually, with one finger in the mouth and another under the chin, fluctuation may be distinguished, not so clear as in the case of ranula, but more doughy; and the wall may pit on firm pressure.

The symptoms vary with the size of the cyst; as it enlarges, speech becomes less clear; there is difficulty in swallowing, with drivelling of saliva and weakness from want of food, ultimately dyspnœa from pressure backwards of the epiglottis (Fig. 15).

The complications which ensue are: inflammation with thickening of the wall, also suppuration, which is rarely spontaneous, and is usually provoked by unwise treatment, as a consequence of which rupture may ensue and a fistula open, either into the mouth or below the chin.

The *diagnosis* of a dermoid cyst is generally made without difficulty. Its position, its yellowish colour when it bulges in the mouth, and pitting on pressure are the special signs. The diagnosis from ranula has been already mentioned; that from salivary calculus and its complications may be made by the relative softness of a dermoid cyst and by the absence of signs of inflammation. The only other affections for which it may reasonably be mistaken are very soft, innocent tumours, which are excessively rare in the situations where dermoid cysts occur.

Dermoid Fistulae.—A number of fistulae have occurred opening into the mouth or on to the neck, owing to attempts to cure dermoid cysts by puncture, incision, or seton, without removing the cyst-wall.

A remarkable fistula in the middle line of the tongue is described by Furnival. A man, aged forty-two, had a

swelling under the tongue for a year and a half which was pricked and cauterised, afterwards continuing to discharge intermittently. An ill-defined lump, the size of a hazel nut, remained on the tongue and projected underneath, midway between the tip and the floor of the mouth. From this a fistulous tract led back towards the foramen cæcum, which was not patent. The tract was the size of and felt like the vas deferens. It was found after excision to be lined by stratified epithelium surrounded by connective tissue.

Treatment.—A dermoid cyst should only be treated in one way, viz. by complete excision. If the tumour is well to the front, it may generally be removed through the open mouth, unless it is of very large size. Indeed, we have more than once succeeded in removing a lateral dermoid near the angle of the jaw, through the mouth. The separation of the cyst-wall is accomplished, after division of the over-lying tissues, with the finger, assisted by a blunt, slightly-curved elevator. The fibrous band which unites it to the bone may need division with scissors. The cavity is plugged with iodoform gauze. Care must be taken to remove the whole of the cyst-wall, or a fistula will remain. A general anaesthetic is almost always necessary. The patient should be placed on one side, with the head forwards and downwards, and the mouth be kept open by a gag.

If a dermoid cyst is of very large size, or so situated that it may be dangerous or very difficult to remove it through the mouth, it must be taken out through an incision behind the lower jaw. A linear incision is made between the chin and the hyoid bone, the median raphé of the mylohyoid divided, the geniohyoglossi retracted, the cyst (unless small) punctured and evacuated. The wall can then be separated by blunt instruments, except for adhesions to bone, which have to be divided with knife or scissors. A lateral dermoid requires a different incision, in accordance with its position; but the principle of the operation is the same.

Dermoid fistulæ must be completely excised, and for this a careful dissection is necessary through a sufficiently wide incision.

2. Mucous Cysts.

These might be expected to frequently occur in connection with the numerous mucous glands, yet with the exception of those which will be referred to on the base of the tongue behind the circumvallate papillæ, the occurrence is rare and perhaps has been considered too trivial to have been put on record. They are probably obstruction cysts, similar to those which occur on the lip, translucent and containing a clear viscid fluid. The contents distinguish them from the only things with which they are likely to be mistaken, viz. cysticercus and echinococcus cysts.

After painting with cocaine the wall should be seized by forceps, and cut off level with the tongue by scissors curved on the flat.

3. Blood Cysts.

A cyst containing blood is a very rare condition, but latterly several cases have been described in which the very vascular cysts and tumours at the foramen cæcum in connection with the thyreoglossal tract have contained blood. In fact, this is one of the special peculiarities which practically renders them identical with the adenomatous cysts and tumours of the main thyroid gland itself. A case which appears to be of this kind is related by Bryant in the 41st volume of the Guy's Hospital Reports. The patient was a girl, eighteen years of age, who had a fluctuating swelling at the back part of the tongue, reaching as far forwards as the circumvallate papillæ. It was smooth and rounded. It had been noticed only four or five months, and during that period had slowly increased in size, but Bryant thought it had probably been there for a much longer time. During the last ten days before admission she had bled to a considerable amount from the nose and mouth.

The cyst was opened, but only blood escaped. The cavity was plugged with lint, and by-and-by filled up from the bottom. Some time afterwards she came to the hospital to report herself as well.

Bruce Clarke exhibited a patient in whom there was a blood cyst on the front of the tongue which had formed in a degenerating nævoid tumour. At the first tapping it

yielded serous fluid, the next time blood, and quickly refilled. He proposed to excise it.

Extravasations of blood from the dilated veins and capillary tufts is a common feature of macroglossia and lymphangioma.

4. Parasitic Cysts (*cysticercus cellulosæ* and *echinococcus*).

These cysts were reserved for mention in this place when other parasitic affections of the tongue were mentioned. Always rare, the disease will by-and-by become of historical interest only, since it is understood that the parasite is killed by properly cooking the food, and the tapeworm will not be propagated if dogs are prevented from eating the carcases of animals affected by hydatids.

Cysticercus Cellulosæ.—The cysticercus is deep-seated in the muscular substance of the tongue. Roser, in 1861, said that he had met with several cases, and had once made a correct diagnosis. A round, firm, or quite hard, circumscribed nodule, of the size of a pea or cherry, was found situated more or less deeply in the muscular substance. Shillitoe, in 1863, found three cysts in a child of eight. One cyst occupied the entire thickness of the tongue, the others projected on the upper, under and lateral surfaces, forming rounded, firm, semi-fluctuating elevations. The cysts had a translucent lining membrane with clear fluid containing cholesterol and bodies the size of mustard seeds with disc-like heads, but showing no hooklets.

In Lannelongue's case a cyst, the size of a small pea, on the dorsum of the tip of the tongue of a boy aged two and a half, had a bluish white, translucent wall, within which was a living cysticercus with a double row of hooklets. Broca has described a similar case. Hofmokl, in 1877, mentioned the case of a boy from whose tongue a cyst was extirpated which proved to be a cysticercus. Two little nodules in the skin of the breast were possibly of the same nature, but were not further examined.

Molière saw a man, aged twenty-four, in whom a cyst had rapidly grown to the size of a pea; then followed an attack of acute glossitis, after which the cyst appeared,

of the size of a nut, deep in the muscles of the tongue. Within a transparent cyst-wall was a cysticercus with a head, suckers, and a crown of hooklets.

Echinococcus or Hydatid Cysts.—A few observations are recorded of the occurrence of hydatid cysts in the tongue. Gosselin saw in a man, aged sixty-two, a cyst which had existed in the floor of the mouth for some time, pushing the tongue upwards and backwards, hindering deglutition and speech, and projecting somewhat under the chin. It was the size of a hen's egg, and, after treatment by puncture and by seton had failed, a cyst, lined by hydatid membrane and containing hooklets, was excised. Richet describes a hydatid cyst, the size of a hen's egg, situated between the geniohyoglossi and projecting into the mouth.

Préchard saw, in a child aged seven, a tumour the size of a Tangerine orange which had taken eighteen months to grow. It projected into the mouth in the region of the tonsil, and on to the face in the parotid region. In André's case a boy of ten had a tumour below the jaw the size of an orange. On incision, hydatid fluid, membrane and hooklets were found, the cysts being situated within the capsule of the submaxillary gland.

The treatment of hydatid cysts is very simple and successful. If the cyst is punctured and the hydatid sac turned out, recovery generally ensues. In most instances the sac escapes with the fluid when the cyst is opened; but, if it does not escape, it can generally be easily shelled out. If the wall is degenerated and there seems to be a strong probability that suppuration will continue for a long time, the adventitious cyst should be dissected out.

5. Chronic Abscess.—Chronic abscess may fairly be considered in this place on account of some similarity which it presents to the diseases which have been just described. It has many of the characters of a cyst. It is perfectly circumscribed, lies just beneath the mucous membrane, which may be perfectly movable over it, and is smooth on the surface. Fluctuation may be perceptible if the pus is not too tightly packed; and the little tumour is not usually painful or tender. Such a tumour may, therefore, easily

be mistaken for a cyst; but abscess is common in the dorsum of the tongue in front of the circumvallate papillæ, while mucous cysts are found behind the papillæ; cysts are usually more prominent than abscess, and abscess is never translucent.

It is very improbable that a chronic abscess should be mistaken for a carcinoma; yet the mistake has happened, when the abscess has been of small size, rather deeply situated, and yielding no sign of fluctuation.

A chronic abscess of the tongue never attains a large size, and is in most instances not larger than a small nut. It may exist for years without even reaching the size of an ordinary nut. Its commencement is insidious, and very seldom is there any history of inflammation preceding the appearance of the tumour. It is an uncommon disease, and is met with more often in the tongues of adults than of children. It is almost always due to slight injury, and may sometimes be traced to a prick with a toothpick; but it may be of tuberculous or syphilitic origin. The diagnosis has already been discussed, and it only remains to add that the presence of chronic suppuration should always be suspected when there exists in the substance of the dorsal aspect of the tongue a small, circumscribed, smooth tumour, not very prominent, not translucent, not painful or tender, of long standing, rounded or ovoid. The diagnosis may be confirmed by an incision, and free incision with scraping generally serves for the cure of the disease. If the cavity fills again, owing to the thick wall of the abscess, excision will be necessary.

CHAPTER XIV.

DISEASES OF THE BASE OF THE TONGUE.—THYREOGLOSSAL CYSTS AND TUMOURS.

Follicular Inflammation of the Lingual Tonsil—Follicular Abscess of the Lingual Tonsil—Hypertrophy of the Lingual Tonsil—Varicose Veins at the Base of the Tongue—Thyreoglossal Cysts and Tumours—The Hyoid Bone: Injury, Necrosis, Tumours.

In Chapter I., p. 4 and p. 14, the anatomical considerations relating to the base of the tongue have been detailed. The affections to which the base of the tongue is liable group themselves into two divisions—those connected with the lingual tonsil and the lymphadenoid tissue of which it is composed, and those connected with the thyreoglossal tract and the thyroid gland, of which it is an outlying part.

1. The Lingual Tonsil.—*Follicular Inflammation.*

Under the name of “lingual quinsy” Dr. David Craigie described, sixty years ago, an acute inflammation of the base of the tongue, apparently a very severe disease; for one of the patients whom he saw died of it, and three or four patients recovered only after being exceedingly ill during the few days that the inflammation lasted. An acute glossitis, due to streptococcal infection, may attack especially the base of the tongue, and also there are rare cases, as has been mentioned, in which the base of the tongue is attacked by diphtheria. Lingual quinsy may be a severe form of acute tonsillitis, in which the inflammatory swelling is not so strictly limited as usual to the faucial tonsils, but extends to the base of the tongue and to the neighbouring parts, producing a considerable secondary swelling of the whole tongue. There is especial danger to life in such cases from laryngeal obstruction. But the follicular inflammation which occurs at the base of the tongue, although it is an altogether similar disease, may

exist without the faucial tonsils becoming involved. Whitish-yellow, hard concretions distend the crypts of the lymph follicles and project from the surface.

These chiefly consist in an overgrowth of the corneous layers of the epidermis, which form concentric masses of shed epithelium distending the follicle; hence has arisen the term keratosis or hyperkeratosis. This affection is well described and illustrated by Kelly.

The lingual tonsil is generally diseased alone, but may be attacked in common with, or secondary to, the faucial tonsils. The predisposing causes are anaemia and other conditions which impair health, such as badly ventilated rooms. Friedland noted the occurrence of follicular concretions in a number of medical post-mortems. Women who use the voice in singing, also clergymen, are said to be especially predisposed. The symptoms vary according to the acuteness of the attack. Commonly they commence with pain in swallowing, aching, irritability, and cough. In the laryngeal mirror one or more follicles (Fig. 16) are observed to be swollen and projecting with masses in the centre, or the concretions in several follicles may be joined by bridges of whitish-yellow material. The concretions are firmly adherent in the follicles, from which they are scooped out with difficulty. The concretions are found to be composed of squamous epithelial cells with leptostrix threads. The tendency of the symptoms is to subside, and then to recur, especially when the patient is exhausted or uses the voice excessively.

The general treatment of follicular inflammation consists in adopting measures which will tend to improve the patient's health, and in the removal of causes of irritation, such as tobacco smoke. But in order to cure the patient the follicles must be cleared out, or the lingual tonsil removed.*

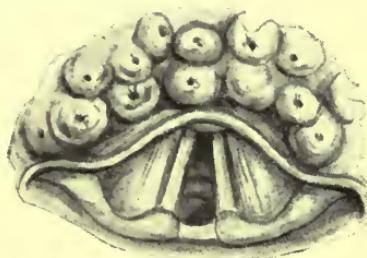


Fig. 16.—DRAWING OF A SWOLLEN LINGUAL TONSIL AS SEEN BY THE LARYNGOSCOPIC MIRROR.

* Although I have seen a large number of tongue and throat cases, I have

Follicular Abscess.—A follicular inflammation may run an acute course with marked pain and difficulty in swallowing, and, if the mouth of the follicle remains closed, an abscess forms. The symptoms are practically similar to ordinary acute tonsillitis without the faucial tonsils and pillars being swollen (Wetmore). The abscess is small and circumscribed, containing the staphylococcus pyogenes in the pus. It may burst, and relief follows; then, upon examination, a sinus will be found, into which a probe can be passed. When the abscess is situated on one side there is a corresponding swelling of the tongue, a hemiglossitis, which is the more marked when the faucial tonsil and pillars of that side are also involved, as in the case described by Knight. An abscess in this position may only come into view when the patient is examined by the laryngeal mirror, or it may be touched by the finger, or, if large, seen when the mouth is opened.

The abscess may be incised with a curved, pointed, guarded bistoury, guided by the finger. The patient should be sitting up with the head hanging forward, or lying on one side with the head low. The better plan is to open the abscess under the guidance of the mirror to avoid wounding superficial veins. After painting with cocaine, the abscess is first punctured so that pus shall not at once flood the patient's pharynx. When he has cleared his throat, a free incision is made, and the cavity wiped out or curetted.

Hypertrophy of the Lingual Tonsil.—The lingual tonsil may become permanently hypertrophied (Fig. 15), and may require removal. This is best accomplished by means of a hot wire loop or by punctures with the electric cautery.

Lymphosarcoma (see Sarcoma of the Tongue, Chapter XVII.).

Varicose Veins at the back of the Tongue.—So much has been written on this subject during the last ten or more years that it cannot be passed over in silence. At least twelve different symptoms have been attributed to this condition, amongst them pain at the back of the tongue, hoarseness,

seen very few cases indeed of affection of the lingual tonsil, and still fewer which required active treatment. I have come to the conclusion that the importance of the subject has been somewhat exaggerated.—H. T. B.

irritability, dysphagia. Our experience has led us to believe that there is really no condition of the veins at the base of the tongue which merits to be called varicose. Any person who looks at these veins for the first time with the laryngeal mirror in a healthy person will be struck by their large size and the quantity of blood they appear to contain. The symptoms which have been associated with enlargement of the veins are such as are very common in neurotic subjects. We have never applied the cautery to these so-called varicose veins, nor do we think we are likely to do so.

2. Thyreoglossal Cysts and Tumours.

As already mentioned in Chapter I., the researches of His made on very young human embryos have enabled this tract (there is no sign of any duct) extending from the foramen cæcum to the pyramidal lobe of the thyroid gland to be fully traced. It has proved of the greatest service in explaining the occurrence of the cysts and tumours now to be described (Fig. 2, p. 5).

(a) *Thyreoglossal Cysts and Tumours on the Dorsum of the Tongue in the Position of the Foramen Cæcum.*—Cases have been put on record of which the pathology can now be explained. Thus, Hickman in 1868-9 described a congenital tumour of the tongue extending from the circumvallate papillæ nearly to the epiglottis, and deeply into the tongue, which caused death by suffocation sixteen hours after birth. The infant's tongue, with the tumour, is preserved in the College of Surgeons' Museum (No. 2271). The Morbid Growths Committee of the Pathological Society at that date described the tumour as consisting of hypertrophy of racemose glandular structures with connective tissue and blood vessels.

In 1883 Bryant described a cyst of the base of the tongue reaching forwards to the circumvallate papillæ, which had existed for four or five months in a girl of eighteen. During the previous ten days the patient had bled to a considerable amount from the nose and mouth. The cyst was incised and plugged, and healing followed. Butlin described in 1890 two cases of tumour in the position of the foramen cæcum, and gave drawings of the microscopical sections, which are here reproduced (Fig. 17). They would formerly have been described

as adenomata; but, in accordance with the views expressed by Bernays and Bland-Sutton, opinion was expressed that they consisted of thyroid gland tissue. On looking at the microscopical sections again, the thyroid nature of the tumours is, if anything, more evident than in the drawings.

Cysts may occur in connection with these tumours. And in some cases the entire tumour appears to be composed of a single cyst. But a careful microscopical examination shows

that the cyst is lined with ciliated epithelium, and that there is thyroid gland tissue in its wall, which is extremely vascular. This gives rise to a characteristic feature of these cysts, the liability to recurrent attacks of haemorrhage, causing a sudden enlargement if the wall remains intact, or free haemorrhage into the mouth when the cyst wall is ruptured. Although often not larger than a pea, the cyst may increase to the size of a

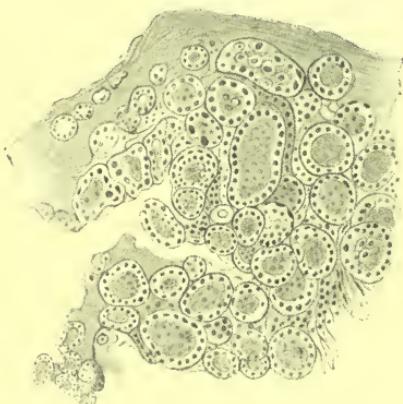


Fig. 17.—THYREOGLOSSAL TUMOUR.

Drawing reproduced from Butlin's paper. The Microscopic Sections are in St. Bartholomew's Hospital Museum.

cherry or more. Johnson described a congenital cyst of the tongue, lying between the circumvallate papillæ and the epiglottis, lined by several layers of flattened epithelium, which caused such dyspnœa that tracheotomy had to be performed when the child was aged four months, and death ensued one week later. So vascular are the tumours that simple puncture of the swelling has caused a pint of blood to be lost, and the recurrent haemorrhage may render the patient anaemic. It is this tendency to haemorrhage which brings about sudden changes in the size of the tumour. The tumours are situated in the position of the foramen cæcum; but, if large, they tend backwards towards the epiglottis. They are generally sessile, varying in size from a cherry to a hen's egg. They appear well defined, but on palpation a solid and a cystic tumour

resemble each other. They cause no projection beneath the chin, although there may be a second tumour just above the hyoid bone. The surface is covered by the normal stratified epithelium, and the colour is variably described as bluish-brown or dark red. Owing to its vascularity, this colour is readily changed by haemorrhages. The tumour is enclosed in a distinct capsule with septa, and appears on section of a brown or reddish colour, and small cysts are seen from which colloid matter can be squeezed; and if the cyst is large, the fluid may contain blood or clot. Under the microscope there is to be seen typical thyroid gland tissue, spaces lined by cubical epithelium, and containing colloid matter, with or without a cyst in the centre of the tumour lined by ciliated epithelium. Besides this, parts of the tumour may present embryonic thyroid tissue or spherical nodules similar to thyroid adenomata. These cysts are more commonly met with in young patients just before or about puberty, but they may be seen at the extremes of life. The tumour may be congenital, but has been seen in patients aged fifty-two and seventy-seven. The affection is much commoner in women.

An abnormal condition of the thyroid gland itself often exists along with a thyroid tumour. In particular, the gland may be ill-developed or absent, and the tumour upon the dorsum of the tongue has been proved to have been physiologically an active thyroid gland in that its removal has produced in the patient operative myxoedema or cachexia strumipriva. Chamisso de Boncourt described the case of a cretin, aged thirty-seven, who appeared like a girl of ten. She had a tumour in the position of the foramen caecum which impaired speech, deglutition, and respiration. The tumour was of the size of a walnut, and was removed through the mouth after tracheotomy, when it was found to consist of thyroid tissue. No thyroid gland could be felt. Six months afterwards no signs of recurrence had appeared; but there was swelling of the eyelids, of the root of the nose, slight oedema of the back of the hand, and marked swelling of the lower part of the leg and foot. Thyroidin treatment was therefore adopted. Seldowitch removed a tumour the size of a cherry from the base of the tongue of a girl, aged fourteen, with the galvano-

cautery. He found that the tumour consisted of thyroid tissue. Seven months later the patient was seen again with well-marked myxœdema, including intellectual changes. No thyroid gland could be felt in the neck. Treatment with thyroidin completely cured the patient. A man, aged twenty-five, had spoken since childhood as if he had a lump in his mouth, and for three years there had been repeated haemorrhages. A tumour was removed from the base of the tongue in the position of the foramen cæcum by Reintjes after tracheotomy and the division of the palatoglossal folds. The tumour consisted of normal thyroid tissue. There was no sign of a thyroid gland in the neck; and after the operation the patient developed myxœdema. The thyroid gland may be, however, perfectly healthy. It may feel normal, the isthmus has been exposed during the tracheotomy operation and has been found normal, also no disturbance has followed upon removal of the lingual tumour.

In some cases a thyroid tumour on the dorsum of the tongue has been accompanied by one in the region of the hyoid bone. In Bernays' case one tumour projected from the base of the tongue into the pharynx, and another was found above the hyoid bone in the middle line. In the case described by Galisch a thyroid tumour had been excised from the middle line, just above the hyoid bone, a year before a similar tumour developed on the dorsum of the tongue.

Diagnosis of Thyreoglossal Cysts and Tumours in the region of the Foramen Cæcum.—As a summary of the features already noted, the cyst or tumour, if small, is exactly in the position of the foramen. It may pass unnoticed or slowly enlarge and cause slight difficulty in speech and deglutition; but if large it extends back towards the pharynx and presses on the epiglottis. It is of slow growth, and is not attended by any glandular enlargement, although it may be accompanied by a tumour in the region of the hyoid bone. The thyroid gland may be normal or not felt. It may cause recurrent haemorrhage from the pharynx with no, or only slight, provocation, which has the character of free oozing and produces anaemia, but is

not accompanied by fixation of the tongue or foul breath. On inspection, a brown or reddish projection is seen, from the size of a pea to that of a cherry or walnut, exceptionally to the size of an egg, sessile, not pedunculated, covered by normal epithelium. Over it course largish veins, between which paler, glistening protrusions of small cysts may be seen. To the touch the tumour feels soft and circumscribed, without any sign of induration. It is usually so soft that the finger cannot distinguish between a cystic and a solid tumour. The chief importance in the diagnosis is to distinguish it from a malignant tumour, lest an operation in excess of the requirements of the case be carried out. The absence of ulceration, of induration and of glandular enlargement, together with the length of time the symptoms have lasted, and the early age of the patient, who is often a woman, all negative the idea of cancer, which the recurrent haemorrhages might suggest.

Treatment.—Supposing a cyst or tumour of small size to be found by chance, which has not caused symptoms, there is no indication for treatment. No case has been described where such tumours have become the seat of malignant disease.

If the symptoms are slight, due to a temporary congestion, the administration of iodides and the application of an astringent paint may suffice to permanently relieve the patient. The tumour may be really a supplementary thyroid gland; indeed, as the cases show, it may be the most active portion of the gland.

The simple presence of a tumour, therefore, is not a sufficient indication for an operation. But an operation is indicated when speech and deglutition are progressively impaired, when there is a continuous cough, pain, etc., and especially when the tumour begins to impede respiration, and to occasion recurrent haemorrhages.

The simplest form of operative treatment is carried out under cocaine, guided by the laryngeal mirror. The projecting tumour is snared by the galvano-cautery wire or burnt down level. Care should be taken not to set up haemorrhage by using the cautery too hot, or by working too quickly. The tumour should not be punctured, or incised,

or torn off with the cold snare, otherwise free haemorrhage may take place, which will be difficult to control with the patient awake. This plan removes only the projecting tumour, yet this may suffice, especially when a thyroid gland cannot be felt. The relation of one of Butlin's cases shows this, and also Rushton Parker's case, which is mentioned in the paper. Threatened recurrence of the growth in each instance was followed later by subsidence.

The more thorough method is to operate under chloroform, with the head hanging low, the mouth well gagged, open, and the tongue drawn forwards. The tumour can be outlined by incising the epithelium around it, and can then be shelled out. The cautery may be used for cutting round the tumour if the veins are large. Bleeding is arrested by sponge pressure, by ligaturing any bleeding point, or by touching with the cautery. The edges of the wound may be drawn together by sutures. If the bleeding is carefully arrested, and the after-treatment directed towards keeping the healing surface healthy and protecting it from being rubbed by solid food until it is healed, there will be no danger of secondary haemorrhage.

A preliminary tracheotomy is unnecessary, except when the patient cannot breathe easily under the anaesthetic. There is no danger of blood getting into the larynx if the operation is done as described.

A submaxillary operation is an excessive procedure for a tumour at the foramen caecum. It should be undertaken only when a tumour about the hyoid bone has extended upwards secondarily.

(b) *Thyreoglossal Cysts and Tumours in the region of the Hyoid Bone.*—Streckeisen in 1886 made a number of post-mortem examinations with respect to the presence of accessory or supplementary thyroid gland masses in the neighbourhood of the hyoid bone. This was in Basle, where the patients lived in a region where diseases of the thyroid gland are endemic; hence, perhaps, a greater prominence of accessory thyroid bodies. This may explain the negative results arrived at by Kanthack, who worked in Berlin and in this country. Streckeisen divided these accessory thyroids as follows: (1) Glandulae præhyoideæ lying in front of the mylo-

hyoid muscle and the hyoid bone, covered only by cervical fascia. The masses may be distinct or connected with the pyramidal lobe below or with the suprathyroid gland masses above through the mylohyoid muscle. The connection may be glandular, fibrous, or simply vascular. (2) Glandulae suprathyroideæ found as small nodules just above the attachment of the mylohyoid muscle, sometimes covering the anterior surface of the hyoid bone, and intimately connected with the periosteum, which may form a sort of capsule for the gland masses. The connection with the pyramidal lobe through the mylohyoid may be intimate. The structure of these thyroid follicles may be normal in appearance, but generally they are ill-developed, without lumen, consisting merely of epithelial strands. (3) Glandulae epiphyoideæ. From the upper border of the hyoid bone there extends upwards between the geniohyoglossi muscles towards the foramen cæcum a strand of tissue which shows thyroid gland, follicles, and colloid granules. (4) Glandulae intrathyroideæ. Glandular masses of thyroid tissue are either developed and included in the body of the bone during the period of ossification, or they grow into the bone from the outside and become embedded, especially the portion of the suprathyroid gland intimately connected with the periosteum. In the hyoid bone were found thyroid alveoli of considerable size communicating with one another, and lined by cubical epithelium. Streckeisen also found mucous cysts lined by ciliated epithelium connected with all these sets of glands.

A better knowledge of this thyreoglossal tract, with its accessory thyroid glands, tumours, and cysts, leads to more correct operations. Surgeons have erred in the past by excess, the tumours having been mistaken for malignant ones; or cysts have been simply punctured, injected, or partially removed, leaving a troublesome fistula in the neck which has lasted for years and resisted repeated opérations.

Thyroid tumours and cysts, when they occur above the hyoid bone and mylohyoid muscle, tend to project at first between the chin and the hyoid bone, then they push upwards and backwards the base of the tongue, causing difficulty in speech, swallowing, and ultimately in respiration (see Diagram, Fig. 15, p. 241), and when they project in the

region of the foramen cæcum, give rise to recurrent haemorrhages. They are situated in the middle line, and may be confounded with the epidermal or dermoid cysts, but feel softer. The distinction is unimportant, however, as the treatment is the same. A girl of eighteen had a tumour in this position, which grew until tracheotomy became necessary. Wolff divided the lower jaw and split the tongue, after ligaturing both linguals. A tumour the size of a walnut was removed from the middle line of the tongue beneath the mucous membrane, and was found to be composed of thyroid tissue. The case described by Galisch is of especial interest, owing to the secondary extension of the growth to the base of the tongue. A woman, aged twenty-four, had a tumour the size of a hazelnut between the chin and the hyoid bone. It was removed through a transverse skin incision, which healed after three weeks, leaving a scar seven centimetres in length. She remained well for a year, when suddenly, at dinner, she felt a sharp pain, had an attack of coughing, and brought up a quarter of a litre of dark blood. She felt rather faint, but the bleeding stopped, and she went on with her work. Two hours later, after again taking food, and immediately after swallowing, she felt an obstruction in the throat, and brought up half a litre of blood. Then she had borborygmi and retching, and brought up one and a half litre. Whilst being taken to the hospital she again brought up a third of a litre. In bed the patient felt something warm rising up. She sat up, without cough or retching, and let the blood flow in a stream out of her mouth into the spit-cup. Bleeding recurred for a day or two, then the patient mended slowly. After a month she sat up. At the end of six weeks a complete laryngoscopic examination was made, and a tumour the size of a cherry discovered behind the circumvallate papillæ, hiding the epiglottis. The tumour was punctured, causing sharp haemorrhage, amounting to 400 cc., which was stopped by ice. After low tracheotomy, during which a normal thyroid isthmus was exposed, a **T**-shaped skin incision was made, the tongue split, and the hyoid bone divided in the middle line. A tumour was in this way exposed measuring 2·5 to 3 cm. in diameter, which projected on to the surface of the tongue, encroached at the sides on

the geniohyoglossi and the fauces, and at the hinder part upon the epiglottis. The tumour was cut out with the knife, and there was free haemorrhage, as is usual in goitre operations. Some deep lingual vessels were tied. The wound was closed by suture in stages. The patient swallowed the next day; the tracheotomy tube was removed on the third day. The patient slowly recovered from the anaemia, and was seen six years later quite well. The tumour was composed of thyroid gland tissue.

The case just described represents the full operation which may be required. But granted the existence of a tumour in the middle line of the tongue between the chin and hyoid bone, a median skin incision should be made and the muscles carefully separated until the tumour is reached. It may be found that there is a dermoid cyst which easily shells out; a thyroid cyst or tumour may do this also owing to the well-defined nature of its capsule, and then this small median incision will suffice. The freer T-shaped incision will be required when the tumour is large and its wall friable and vascular. There is no need to make a preliminary ligature of the lingual arteries, as if the tumour is first of all well exposed and carefully shelled or dissected out, only hyoid and dorsal branches of the lingual will be injured. The hypoglossal nerves must be carefully avoided. A preliminary tracheotomy will not be necessary except when the tumour pushes up the base of the tongue and the patient cannot breathe easily under the anaesthetic. The hyoid bone may be divided (*see* below), but there is no need to cut through the lower jaw.

Below the mylohyoid cysts and tumours are frequently seen in young adults, both women and men. When first noticed they may be of the size of a pea, but may grow gradually larger if not removed. Thus, they have been seen of the size of a mandarin orange (Liaras). Perhaps the extreme limit was reached by the case described by Waterhouse, which had existed for thirty years. The cyst reached from the lower jaw to the clavicle. It bulged into the mouth so that it seemed almost to divide the tongue into two, extending up to the mucous membrane. The cyst was firmly adherent to the hyoid bone and to the thyroid isthmus, and

contained two pints of fluid. These cysts and tumours have been frequently punctured or injected with iodine, or have spontaneously ruptured, leaving a fistula opening into the neck, which continues to discharge a glairy fluid, especially when the patient is at meals, and this may go on for years.

There is ample evidence, from microscopical examination, afforded by the papers of Durham and others, that these cysts are lined with ciliated epithelium or arise secondarily in

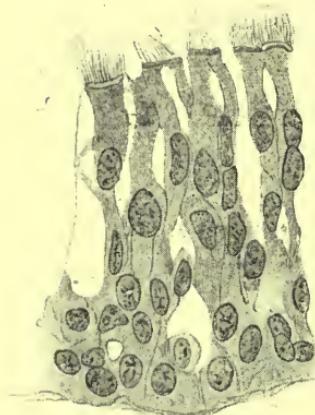


Fig. 18. — CILIATED EPITHELIUM FROM A THYREOGLOSSAL CYST.

Copied by the kind permission of Dr. H. Durham, from his paper.

inwards upon the epiglottis and the larynx.

These tumours and cysts cannot be confused with anything else, lying as they do either in the middle line or just to one side between the thyroid isthmus and the hyoid bone. There are no lymphatic glands in this region. Sebaceous cysts involve only the skin, but a dermoid cyst lined by stratified epithelium may occur in the same position. It is treated in the same way and will shell out easily.

An enlargement of the bursa described by anatomists as existing between the hyoid and thyroid cartilage has been given as an explanation of the occurrence of these cysts. Such an enlargement should contain serous or synovial fluid, with fibrinous bodies like poppy seeds, rice grains, or melon seeds, with a wall lined by flattened epithelium and composed

thyroid tumours. Even when a fistula has existed some time and much of it is lined by granulation tissue, yet remains of ciliated epithelium and thyroid gland tissue may be found. These cysts and tumours are continuous with the pyramidal lobe and isthmus of the thyroid below and with the hyoid bone above. They are covered by the deep fascia and the septum of the sternohyoid muscles, and lie on the thyrohyoid ligament, from which they are quite separate. They do not in any way involve the thyrohyoid ligament, except by bulging it

of fibrous tissue. This has never been demonstrated. One cannot deny the possibility of the occurrence, but the statements with regard to this supposed distension of the thyrohyoid bursa are purely traditional. It will be enough to note that it must be quite an exceptional condition, and it can be only accepted as occurring when it shall have been demonstrated. Meanwhile, statements about thyrohyoid bursæ may be ignored.

If acute inflammation be set up in one of these cysts or tumours some confusion may arise, and the case may for the moment be diagnosed as syphilitic or tuberculous disease of the thyroid cartilage, but when the inflammation has subsided a fistula will be left discharging glairy fluid.

The close connection of such cysts to the hyoid bone may be noted during post-mortem examinations or anatomical dissections. In the College of Surgeons' Museum, specimen No. 232 A, is a thin-walled cyst overlying the thyroid cartilage and thyrohyoid ligament, and extending up behind the hyoid bone, taken from a dissecting-room subject. Specimen 232 is a dried specimen of the hyoid bone with a round thick-walled cyst more than two inches in diameter. The specimen was obtained from Liston's museum, and was taken from a sailor between fifty and sixty, in whom the cyst had existed nearly as long as he could remember. The cyst was covered by the sternohyoid muscles, loosely connected with the surrounding soft parts, and attached to the posterior surface of the hyoid bone. The cyst was full of brownish-yellow, thick, grumous, honey-like fluid containing cholesterin crystals. (This is not the contents of an enlarged bursa.)

Treatment.—A cyst or tumour must be carefully excised with the patient under a general anaesthetic. Any strand leading up to the hyoid bone or towards the thyroid isthmus must also be followed up. Attempts to do this without an anaesthetic, by freezing or by cocaine infiltration, etc., will probably fail. Puncture and injection methods are quite wrong, and produce fistulæ. Fistulæ are much more difficult to excise than the uncomplicated cyst or tumour, yet this may be successfully accomplished, as shown by the cases described by Durham and others.

In particular, it is necessary to remove the wall of the cyst or fistula when it is adherent to the posterior surface of the hyoid. Generally, a division of the bone is not required. Exceptionally, it is needed when the bone itself is actually involved, and no evil consequences follow from the division. Schlange operated upon a man, aged twenty, who had a fistulous opening in front of the thyroid cartilage; the upper end of the fistula was continuous with a tumour the size of a cherry firmly attached to the periosteum of the hyoid. The middle of the hyoid bone was resected, when another tumour of similar size was found attached to the periosteum of the posterior and upper surface, from which a gradually diminishing extension of the tumour was followed up to the base of the tongue. The tumour consisted of many-branched alveoli, lined by columnar ciliated epithelium embedded in fibrous tissue. Beck also divided the hyoid bone to cure a fistula extending up behind. Not the slightest difficulty followed with deglutition or speech. A division of the hyoid bone may be adopted therefore without hesitation if it is found necessary in order to cure the patient.

Some other conditions involving the hyoid bone may be briefly referred to.

3. The Hyoid Bone.

Fracture of the Hyoid Bone.—This may be caused by a garrotte, by a blow, or by a bullet (Uhlmann). There is danger of simultaneous injury to neighbouring vessels, also the larynx may be involved, or oedema glottidis may set in requiring tracheotomy. Displacement may be rectified by a finger in the pharynx, after which measures must be taken to avoid septic infection.

Dislocation of the Hyoid Bone.—Wood has described a partial dislocation of the hyoid occurring during cough in phthisical patients with tuberculosis of the larynx. One cornu appeared tilted up and fixed. The displacement was reduced by holding the bone with the thumb and finger, and telling the patient to swallow.

Tuberculous Caries.—Uhlmann removed a carious hyoid bone from a man, aged twenty-eight. No disturbance followed, and the wound healed. The caries is generally secondary to laryngeal tuberculosis.

Pyæmic Abscess.—Uhlmann also mentions Stetten's case, in which a pyæmic periosteal abscess followed otitis media purulenta.

Syphilitic Nodes and Gummata.—Elliot mentions six cases in whom there were tenderness and thickening of the hyoid bone without any laryngeal or pharyngeal affection, which disappeared on administering iodides. Amongst them were two women suffering from periosteal nodes in common situations.

Le Dentu also describes a tumour of the hyoid bone in a woman, aged seventy-one, which may perhaps have been a gumma.

Tumours of the Hyoid Bone.—Fibro-cartilaginous tumours, perhaps having a branchial origin, have been found attached to the great cornu of the hyoid bone.

Andérodias and Hugon found in a child, aged five months, a nipple-like appendage composed of fatty and fibromatous material with cartilage.

Bœckel described, in 1862, a cystic fibro-chondromatous tumour intimately united with the great cornu. It had been noticed for three years in a woman, aged fifty, and had reached the size of two fists. The tumour was removed with the great cornu, but secondary haemorrhage followed from the external, and then from the common carotid, and the patient died on the seventh day.

Spisharny's case showed a tumour the size of a hen's egg, closely connected with the right cornu, with which it moved. The great cornu was cut across, and then the encapsulated tumour easily shelled out. It was composed of fibrous tissue and cartilage with numerous cells.

CHAPTER XV.

HYPERTROPHY OF THE TONGUE, OR MACROGLOSSIA.

Lymphangiomatous Macroglossia, including Lymphangioma—Simple Muscular Macroglossia—Inflammatory Hypertrophy.

OTHER names used are elephantiasis and lymphangioma; those now rarely used are prolapsus linguæ, lingua vituli, lingua propendula, lymphadenoma cavernosum. Three forms of hypertrophy of the tongue can be recognised—

- (1) Macroglossia from dilatation of lymphatic spaces, the lymphangiomatous form, including lymphangioma.
- (2) Simple muscular hypertrophy, generally accompanying a defective intellect or general or unilateral hypertrophy.
- (3) Secondary hypertrophy of inflammatory origin.

1. Lymphangiomatous Macroglossia, including Lymphangioma.

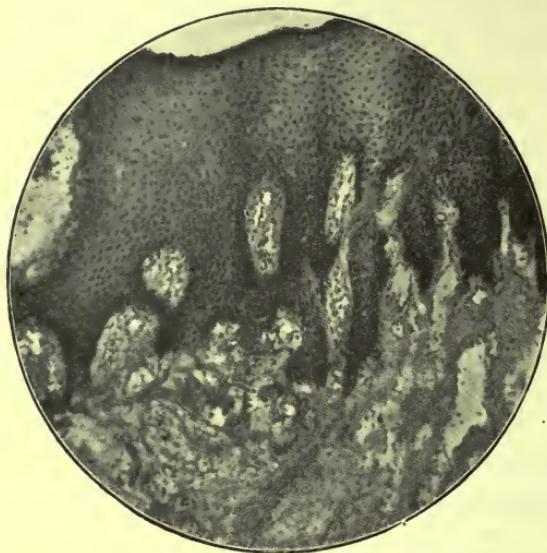
This is the typical form of macroglossia, and the essential feature of its pathology is the dilatation of lymphatic spaces, with which the disease commences, as was first of all clearly demonstrated by Virchow. This dilatation must be due to the outflow of lymph being prevented, whether by the efferent lymphatics not being formed or being subsequently obstructed. That the efferent lymphatics may be so ill-formed that they do not become patent channels seems most probable, seeing that the disease is often congenital, and may coincide with hygroma in the neck. The enlarged condition of the tongue has been noted at birth—so large, indeed, as to prevent breathing, or to shortly cause death. It is not necessary for the congenital origin that the whole tongue should be enlarged at birth; only part has been enlarged, or a patch has been noticed, and subsequently diagnosed as a lymphangioma, or lymphatic nævus. This, after remaining quiescent for a variable length of time, even

until puberty, may then commence to enlarge. Even in those cases in which no enlargement or lymphangioma has been noticed at birth, it seems most likely that the macroglossia, which appears later, has had its origin by extension from some dilated spaces buried in the substance of the tongue. The cases which tell against the invariable congenital origin of lymphangiomatous macroglossia are those in which macroglossia has followed injury. In Dollinger's case of macroglossia in a man aged twenty-one, the disease had commenced after division of the frenum at the age of two. In Sédillot's case of macroglossia in a boy, aged nine, the frenum had been divided at five, after which the swelling commenced. Macroglossia has also set in after operations upon the lower jaw (Girerd). In very many cases it has been made much worse by the inflammation set up by the methods of treatment. The pathology of macroglossia has been the subject of much dispute owing to the differences which exist between cases examined in an advanced stage. But if the simplest form of lymphangioma is considered first of all, the different changes which later on occur can be explained (see the list of references).

Lymphangioma, or *lymphatic naevus*, appears on the surface of the tongue as a group of vesicles which have transparent walls with clear serous fluid. Between the vesicles are bright red points made by capillary loops (Plate VII., Fig. 2). If a vesicle ruptures, clear fluid escapes. If a capillary ruptures into a vesicle, it becomes distended with blood, causing the distended vesicle to assume a bluish-black appearance. The lymphangioma may be a very small patch, or cover a considerable portion of the tongue, or form a sort of crest like a coxcomb. It may project from the surface or extend deeply into the substance of the tongue. Instead of being grouped in a patch, vesicles like millet seeds may be scattered widely on the dorsum, some white containing lymph, others red from arterial blood, others violet from venous blood. If a vertical section be made of a simple lymphangioma, the lymphatic spaces immediately beneath the epithelium are dilated; by further enlargement the lymph space bulges towards the surface, thinning the epithelium by pressure.

until only a layer of corneous epithelium covers the surface. The contents of the space are lymph, serous fluid containing numerous white corpuscles (Fig. 20).

By extension between the muscular fibres and fusion of the lymph spaces large cysts are formed, so that the portion of the substance of the tongue invaded has a honeycombed



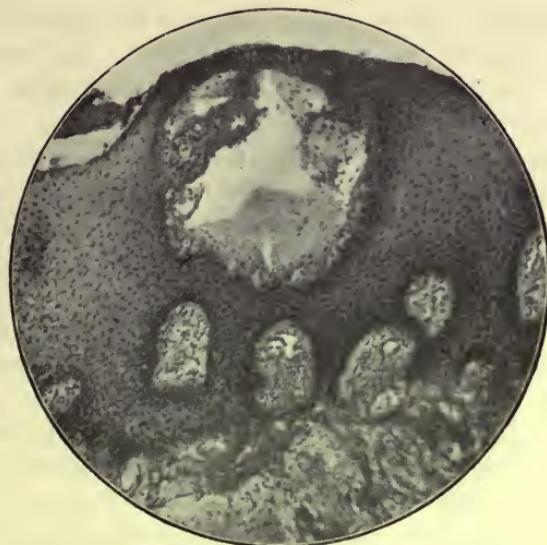
* Fig. 19.—MACROGLOSSIA—HYPERTROPHY OF EPITHELIUM AND SCLEROSIS OF MUSCLE.

look (Fig. 21). Around these dilated lymphatic spaces three changes take place, and it is in accordance with the relative proportions in which each occurs that the differences found in advanced cases are due. These are (*a*): dilatation and new formation of blood vessels, (*b*) inflammatory changes with formation of fibrous tissue, (*c*) new growth of lymphadenomatous tissue.

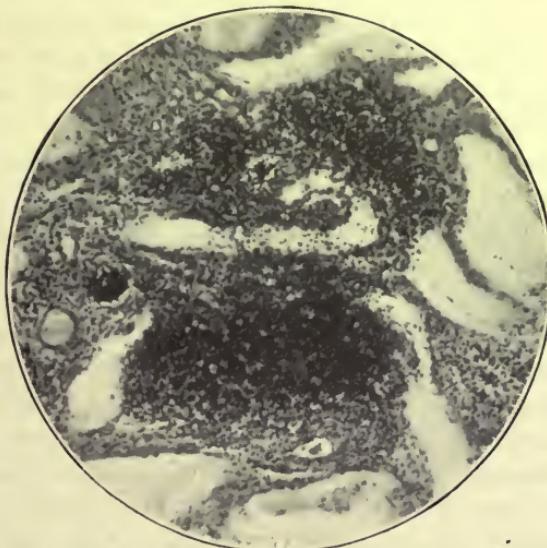
(*a*) The capillary loops between the vesicles in the simple form develop into arteries, thin-walled, coiled, and of a considerable size. The veins also increase in number and become dilated. Then the blood vessels rupture into the

* Photographed from recently made sections taken from specimens kindly sent us by Mr. A. G. Francis, and which will be placed in St. Bartholomew's Hospital Museum (see his Paper).

Fig. 19 shows the overgrowth of the epithelium, the elongation of the papillæ, and the replacement of muscular fibres by tough fibrous tissue.



* Fig. 20.—MACROGLOSSIA—SUPERFICIAL LYMPH CYST.



* Fig. 21.—MACROGLOSSIA—DILATED LYMPH SPACES AND LYMPHADENOMATOUS TISSUE REPLACING MUSCLE.

* Photographed from recently made sections taken from specimens kindly sent us by Mr. A. G. Francis, and which will be placed in St. Bartholomew's Hospital Museum (see his Paper). Fig. 20 shows an unruptured lymph cyst in the thickened epithelium. The cyst is covered by superficial corneous layers and contains lymph and small round cells. Compare Plate VII., Fig. 2.

Fig. 21 shows dilated lymph spaces in the substance of the tongue, between which the muscular fibres have been wholly or partially replaced by lymphadenomatous tissue.

large lymphatic spaces, which become distended, partly by blood clot, partly by circulating blood. In this way is produced the cavernous form of macroglossia (Barker, Hutchinson, jun.).

(b) The dilatation of the lymph space is accompanied by inflammation. Small round cells infiltrate the connective tissues, and tough fibrous tissue increases and slowly surrounds the spaces. The inflammation is subject to sharp fluctuations, a marked increase accompanying the extravasation of blood; then it subsides, but to recur again and again. With each attack there is a further formation of fibrous tissue, which permanently enlarges the portion of the tongue affected, and gives the enlarged tongue a tough or almost wooden feeling, varying with the amount of œdema in the fibrous tissue.

The fibrous tissue presses aside the muscular fibres and causes them to degenerate; so that, whilst the tongue enlarges, the amount of muscular substance is being continually reduced, until it disappears altogether from the affected portion of the tongue. The section shows simply fibrous tissue with a variable number of spaces containing either lymph or blood (Fig. 19).

(c) Small round cells collect in the connective tissue between the muscular fibres, amongst the lymph spaces; and between the cells retiform tissue may be met with. These small round cells are not replaced by fibrous tissue, but a new growth goes on slowly until lymphadenomatous masses are produced (Fig. 21). A macroglossia may even terminate by the development of a small round-celled or lymphosarcoma, as in Eve's and Perkins' cases (Chapter XVII., p. 306).

In any single case, and in different parts of the same enlarged tongue, the relative proportion in which these changes occur will vary. In one case the lymph spaces will be surrounded by enlarged vessels, and will contain blood clot; in another the fibrous tissue will be in excess; in a third the lymphadenomatous new growth. It is the combination of all three changes in varying proportions which brings about the macroglossia.

The earliest signs which precede the general enlargement are the complaint by the patient of especial sensitiveness of

the tongue to hot and highly spiced food, and the formation of a sore patch on the tongue, where blisters form and burst. The enlargement may commence imperceptibly, and affect the whole tongue, or chiefly one-half or one-third at first, although the rest of the tongue is more and more involved as time goes on. But this steady enlargement is generally broken by attacks of acute glossitis, during which the tongue rapidly swells. When the inflammation has subsided the size of the tongue is reduced, but not to that which obtained before the onset of the inflammation.

In the earlier conditions of the disease the tongue may appear soft and limber, yet the whole of the dorsum is intersected by deep fissures with hypertrophied papillæ, dividing the tongue into distinct areas, and causing an increasing sensitiveness (Barker, Hutchinson).

The tongue may be still retained within the mouth, but it is obviously too large; it looks so when the mouth is examined; and speech is affected, so that it is slovenly and rather difficult to comprehend. The entire tongue is larger than it ought to be, and, with the general enlargement, the papillæ are hypertrophied (Fig. 19). As the tongue grows larger, it can no longer be retained within the mouth; it protrudes, or, as it is termed, is prolapsed (Fig. 22). The mouth is now constantly open, saliva dribbles away, and the condition of the patient becomes most pitiful. The surface of the tongue, exposed continuously to the air, may lose its natural aspect and consistence and become dry and hard, cracked and fissured, and the mucous membrane is thickened, and discoloured blue or brown. Even now the functional disturbance is not nearly so great as might be imagined, for speech is possible, and swallowing can be accomplished, though with difficulty, for the patient is often obliged to thrust the morsels of food far back into the mouth with the finger; when once they are at the back of the throat, the difficulty is overcome, and the food is carried without effort into the stomach. The enlargement is not usually the occasion of much pain, unless the tongue (and this not unfrequently occurs from its exposed position) is irritated or injured. It is then very prone to inflammation and ulceration, and, on this account, may be

very painful and tender. With every attack of inflammation the tongue grows larger. Not only does the swelling, which is the direct result of the inflammation, tend to become permanent, but the disease itself is aggravated by the attacks. When the tongue has protruded from the mouth for a



Fig. 22.—A CASE OF MACROGLOSSIA.

The photograph of a patient under Mr. Clutton in St. Thomas's Hospital.

Mr. Clutton also kindly sent us for examination a dental model of the patient's mouth and teeth.

considerable period, the most lamentable effects are liable to follow. The lower jaw is slowly flattened by the weight of the mass which constantly rests upon it; the teeth look forwards and outwards instead of upwards as they ought to do, and are more widely separated from one another than is natural. Thus, when the upper and lower molars come into contact in closing the jaw, the corresponding incisors remain widely separated (Fig. 23). The palate is rendered high and flat, so that speech may become permanently defective. The lower lip becomes everted and thickened (Mirault). Undoubtedly, the deformity of the jaw occurs more readily

by reason of the youth of the patient. The effect is produced by the gradual moulding of a bone which is growing and developing, which, therefore, yields quickly to the force at work upon it. But the same effect is possible on a bone which has long ceased to grow; the patient described by Chalk was thirty years of age when her tongue began to enlarge, and a year later the jaw had assumed the flattened shape proper to this disease. A partial dislocation may be set up. Clutton



Fig. 23.—JAWS DEFORMED BY MACROGLOSSIA.

C. C. von Siebold's Case. Chiron, 1805, I. 651.

has noticed that the alveoli of the teeth are ill-formed, owing to disuse, as the jaws cannot be closed.

It must not be imagined that macroglossia runs a rapid course, or that the effects which have been just described are produced in a few weeks or even months. It is a very chronic malady, slowly advancing during months and years, sometimes stationary for long periods, then quickly enlarging after an attack of inflammation; sometimes steadily, though very slowly, advancing. The worst effects are seldom seen until several years have elapsed. After slowly increasing during many months or years, the tongue may become stationary and cease to grow; but we are not aware of any instance of a well-marked example of this disease diminishing and undergoing spontaneous resolution.

Some of the complicating features of macroglossia have been probably of artificial production. The swelling of the gums, the coating of the teeth with tartar, the loosening and falling out of the teeth, the foul breath, the ulceration and

subsequent adhesions to the cheek or gums, as described in some of the cases, were very likely produced by the mercury, which was either given internally or applied freely to the tongue. Ulceration and sloughing, with septic complications, also followed the leeching and scarifications formerly in vogue.

The drying and fissuring of the surface have often been prevented by the patients themselves covering up the exposed tongue, keeping it in a sort of bag. Another complication is ulceration under the tongue, set up by the edges of the teeth, and leading to small haemorrhages from the ranine veins. Virchow has likened this disease in some respects to elephantiasis (congenital and acquired), and the analogy seems just when the lymphatic relations of the two diseases are considered. In both there is dilatation of lymphatic vessels and connective-tissue hypertrophy; in both the affection seems capable of being excited or aggravated by attacks of inflammation.

In a few cases there has been actual proof of disease of the lymphatics in parts neighbouring to the tongue. Thus, Virchow tells of a little girl, two years old, under the care of Von Textor, who, with macroglossia, had an enlarged (?) gland beneath the jaw containing clear lymph. And Maguire describes the case of a girl of the same age whose macroglossia was associated with a cystic hygroma on both sides of the neck. In this case, the death of the child afforded an opportunity of examining the disease, both of the tongue and of the neck. Valenta has recorded a somewhat similar case.

In Winiwarter's case there was congenital macroglossia, accompanied by a congenital hygroma in the neck. Brault's patient had macroglossia with lymphangiectasis of the floor of the mouth and of the cervico-facial region. Tenneson's patient was a man, aged twenty-three, in whom the macroglossia had been first noticed when he was four months old. He had a venous nævus of the lower lip; also one in the neck at the level of the hyoid bone, as well as a capillary nævus on the ear. In one of the cases (case vi.) described by Maas there was a venous nævus of the lip and tongue, and enlargement followed.

The theory of lymphatic obstruction makes it more easy

PLATE VIII.

Fig. 1.—Warty cancerous growth of the tongue of an old man, which had been leucomatous for many years. The warty growth had not been noticed longer than a few weeks.

Fig. 2.—Protuberant carcinoma of the tongue of a man, with a slough of the central part.

Fig. 3.—Ulcerated and fissured carcinoma in a man, aged 52, under the care of Mr. T. Smith. The tongue lies within the opened mouth, and cannot be protruded.



Fig. 1.



Fig. 2.



Fig. 3.

to understand the relation between macroglossia and such apparently trivial causes of the disease as ranula, abscess, and other affections producing swelling of the floor of the mouth. They tend to produce obstruction to the return of lymph from the tongue, and thus to induce the sequence of events which leads to macroglossia. In reference to the observation of Virchow, already alluded to, regarding the analogy of this disease to elephantiasis, it is worthy of remark, however, that in those countries in which elephantiasis is of frequent occurrence macroglossia does not seem to have been simultaneously observed. Fayerer especially remarks, in his observations on a case of macroglossia which he had seen in a Bengal Brahmin, that this was the only case of the kind he had noted in India.

Granted that the lymphatic obstruction is generally of congenital origin, there is as yet no answer to the question why the disease tends to spread to the whole of the tongue. Hutchinson has termed it "infective lymphangioma," and compared it to lupus lymphaticus of the skin. Mikulicz seems to regard lymphangioma as a new formation of lymph vessels, which dilate into spaces. In his *Atlas* (Tafel xxviii., Fig. 3), there is depicted a sublingual nodular lymphangioma on the right side of the frenum underneath the tongue, forming a tumour the size of a cherry. The patient was a man, aged forty, who had had frequent attacks of inflammation and suppuration, for the relief of which submaxillary incisions and also tracheotomy had been necessary. Then there was a period of quiescence for some years, and finally the tumour was removed by the cautery. But this is not the course of a new growth, and lymphangioma and macroglossia are very different affections from the endotheliomata which arise from the endothelium lining lymphatic spaces. The analogy with elephantiasis, as pointed out by Virchow, still seems the most likely explanation, and some form of micro-organism is probably the cause of the spreading of the lymphangiomatous change. In Brault's case, in which there was macroglossia with lymphangiectasis of the floor of the mouth and of the cervico-facial region, the recurrent attacks of inflammation coincided with teething, and pneumococci were found in the cysts. He believed that the

organisms got in from the mouth, and set up the inflammation. Bacteriological observations on the contents of unaltered lymph cysts may throw further light upon the pathology of lymphangiomatous macroglossia.

Ribbert would draw a distinction between the non-circumscribed dilatation of existing lymphatics and a lymphangioma proper of congenital embryonal tissue forming a circumscribed tumour. But this distinction is practically a difficult one to draw, the lymphangioma continuing to spread, although at a slow rate, so long as it is not, or is only partially, removed.

The *diagnosis* of lymphangiomatous macroglossia is made by the presence of cysts of varying size in connection with a chronic progressive enlargement of the tongue. The lymphangioma may vary from a small clump of vesicles, a broad patch of vesicles with large blood vessels and blood cysts, to vesicles scattered widely over the tongue, or a multilocular cystic tumour beneath the tongue. The presence of some clear vesicles, and the tendency to spread, however slowly, even if there are dilated capillaries and large blood spaces, will distinguish a lymphangioma from a simple angioma or nævus.

Treatment.—There is only one treatment for lymphangioma and lymphangiomatous macroglossia, wedge-shaped excision. The older methods by puncturing, injecting, applying pressure by strapping, incisions, blistering, leeching, use of setons, treatment by mercury or iodide of potassium internally and externally, are calculated only to make the disease worse. The same is the case with caustics and the cautery, which may destroy cysts on the surface, whilst they promote extension in the muscular substance by setting up inflammation.

Generally speaking, the operation should not be postponed, the local lymphangioma should be cut out freely, or as much of the enlarged and projecting part of the tongue cut away as necessary, and then the edges of the wedge-shaped incision united by suture.

The operation may prove fatal from the extreme youth of the patient, as in the case mentioned by Francis. If, however, the infant cannot take food properly and is liable

to attacks of dyspnœa, the operation, carried out with all care, will give the little patient the best chance of living. Unless the case is neglected until puberty, no secondary deformity of the jaw or of the lip need arise. (Compare the cases of Siebold, Fig. 23, p. 271, and Mirault.) If the disease is not far advanced, and the operation can be postponed until the child is stronger and older, nothing should be done to irritate the tongue or to cause extravasations of blood into the cysts. The tongue should be kept in the mouth if possible, *e.g.* by applying a chin-bandage, or, if it is prolapsed, guarded from being chapped with cold and dry air by the use of a respirator, provided that these methods do not impair respiration. If the child cannot suck, it must be spoon-fed.

Recurrence of inflammation and of enlargement of the stump must be ascribed to insufficient removal (Vernon), and as this complication may be dangerous in preventing recovery, it should be avoided. The line of the incision should, if possible, run through healthy muscular substance.

The galvano-écraseur should not be employed, as it will prevent union by suture; moreover, the limits of the disease cannot be so well defined. If the disease is extensive, involving a large portion of the tongue, the lingual arteries may be first of all ligatured. This must, of course, immediately precede the excision, otherwise a free anastomosis would soon be set up. Ligature of the lingual arteries alone may possibly be sufficient in simple muscular macroglossia, as in Fehleisen's case, but would be useless in the lymphangiomatous form.*

2. Muscular Macroglossia ; Simple Macroglossia.

Galen describes a case as follows: "We saw a marked

* Although I have never had to operate in a case of general macroglossia, I have many times removed local macroglossia, and have been struck with the severe haemorrhage which has more than once occurred. I would strongly urge, even in cases in which the disease appears quite superficial, that the incisions should extend well into the substance of the tongue, and that the edges should be speedily brought together with silk sutures. Most of the bleeding is capillary and venous, and is readily arrested by the pressure together of the surfaces of the wound. In the case of infants and children, the stitches may be passed before the incisions are made, and the haemorrhage may be arrested by the fingers of an assistant or by flat forceps until the sutures have been tightened.—H. T. B.

enlargement of the tongue in a patient who had no pain, nor was there oedema, nor cancer, nor inflammation; it did not pit on pressure, nor was it sensitive nor painful; it simply consisted in a great enlargement without the substance of the tongue being at all altered."

A case of simple muscular hypertrophy may be seen in an otherwise healthy child and go on to considerable enlargement without those recurring attacks of inflammation which characterise the lymphangiomatous form, or of an alteration of the surface of the tongue (unless this be artificially produced), or of any alteration in shape; simply an increase in size—"lingua vituli."

But it is notorious that even when the tongue is merely too large for the mouth, yet not prolapsed, the intellect is generally defective, and the more marked cases usually occur in idiots. Parrot noted this, but there is no special connection with inherited syphilis, as he thought. Bruck noted an extreme case of general muscular hypertrophy with macroglossia in an idiot. The patients may be crétiens; at birth there may be macroglossia with congenital crétinism, called also congenital or intra-uterine rickets.

Another group show partial, or unilateral, muscular and osseous hypertrophy, conditions also presumably due to some congenital defect of the nervous system. The muscular hypertrophy may be partial, with symmetrical macroglossia or unilateral, with enlargement of one-half of the tongue. In case v., described by Maas, there was congenital left-sided hypertrophy of the tongue, with, at the same time, hypertrophy of the left half of the body. The skeleton as well as the muscles may be enlarged (Kopal); or the osseous and muscular hypertrophy may be limited to the face and tongue, in the area of distribution of the fifth nerve. Acquired facial hypertrophy from injury, trigeminal neuralgia, or abscess, etc., is not accompanied by any change in the tongue (Sabrazès and Cabannes). Zeisler saw a combination of the lymphangiomatous and muscular hypertrophy in a girl, aged eight, who had muscular hypertrophy on the right side, with dilated lymphatic vesicles on the inner surface of the cheek and tongue, varying from a pin's head to a pea, also on the right side; and a crested formation on the dorsum of the

tongue. With respect to the microscopic examination of the portions of hypertrophied tongue removed, in some cases it has simply been remarked that all the structures were similar to those existing in a normal tongue; in others, two changes have been seen—an increase in the number of muscular fibres and an increase in the size of the fibres. In a case of muscular hypertrophy described by Helbing the hypertrophy was due to an increase, both in number and size, of the fibres; the diameter of the fibres showed remarkable variations—viz. between 10 and 48 μ —the largest being nearly five times that of the smallest. Eickenbusch found the muscular fibres not only increased in number, but one-third larger than the normal in a child of eight, whilst the connective tissue between the muscular fibres had disappeared. In Bruck's case of idiocy and extreme general muscular hypertrophy the tongue was composed of normal, undegenerated, muscular fibres, whilst the connective tissue between was not increased. The muscular macroglossia tends to remain stationary unless influenced by secondary inflammation, caused by the teeth or by attempts at treatment.

Treatment.—This is not generally of an active kind, seeing that these patients are short-lived and weakly, and do not bear operations well. They can usually live by the food being put into the mouth beside the tongue. The disfigurement caused by the tongue hanging out of the mouth is not of serious consequence, and dyspnœa is not generally set up, as inflammation is absent. It will be necessary therefore to have decided indications before operation is undertaken. An operation may be required because the patient cannot take food well, because the size of the tongue hinders breathing and prevents sleep, because the patient's intellect shows a tendency to develop but the large tongue hinders him from learning to speak. In such cases a sufficient portion of the tongue should be removed by a wedge-shaped incision so as to allow of the tongue being retained in the mouth. If this has to be done it should take place before the teeth and lower jaw have become much deformed.

For this simple or muscular hypertrophy Fehleisen

ligatured both lingual arteries. A child, aged thirteen months, had the tongue projecting a good centimetre beyond the lips. After the ligatures had been applied the tongue became of normal size, whilst the next day it was swollen as much as before, and cyanotic. It then gradually decreased, and a year afterwards the tip, when at rest, lay between the teeth. During talking it could be withdrawn between the teeth and some words could be spoken. It seems hardly likely that this operation can replace the wedge-shaped excision. There must be some risk of sloughing owing to the cutting off of the blood supply on both sides, although in Fehleisen's case only the stage of cyanosis was reached. Moreover, the case was not a very advanced one; the tongue protruded only a good centimetre from the lips, and the reduction was only partial, as afterwards the tongue lay between the teeth.

3. Inflammatory Hypertrophy.

Under this heading may be mentioned those enlargements of the whole or a part of the tongue which are the result of an attack of acute inflammation, or which are produced by continual or repeated attacks of chronic superficial inflammation. They are essentially different from macroglossia, inasmuch as the enlargement is not dependent on dilatation of the lymphatic system of the organ. They have no tendency to increase continuously.

As a general rule, after an attack of acute glossitis, whether of the whole or only of one-half of the tongue, the swelling rapidly subsides, but the subsidence is not in all cases complete. One-half of the tongue may remain permanently larger than the other, or an indurated lump may be left in the middle of one side of the tongue. These enlargements may never disappear, but they are not sufficiently great to cause the patient any annoyance or even to affect his speech. Nor are we aware of any instance in which one of these enlarged and slightly indurated parts of the tongue has become the seat of carcinoma at a later date.

Syphilitic Hypertrophy.—We have no intention of describing here those local hypertrophies which are due to the presence of one or several gummata. These are merely passing conditions, which may rapidly give way to treatment,

or which may be succeeded by atrophy or deep scarring of the affected portion of the tongue.

But a large portion or the whole of the organ may be enlarged as the result of syphilis. The enlargement may be due to the presence of a vast number of guminata in the muscular substance, and may cause the tongue to protrude from the mouth. The nature of the hypertrophy is recognised by the tuberous condition of the tongue. It readily improves under treatment. Again, those conditions which produce deep and long furrows in the dorsum of the tongue are especially prone to produce hypertrophy of the parts of the tongue between the furrows. When the furrows are extensive and deep, the hypertrophy of the intervening parts may be very considerable and permanent. During the formation of the furrows, the return of lymph and blood from the intervening parts is probably interfered with; swelling and oedema naturally result, and the parts, like some feet and legs whose circulation has been similarly interfered with, remain permanently swollen. The mischief is further increased by the occasional attacks of renewed inflammation to which such tongues are liable. There is no difficulty in recognising the hypertrophies which are due to this cause; they bear the marks of syphilis deeply graven on them.

Unfortunately, the treatment which tends to cure the ulcers does not always tend to lessen the hypertrophy; on the contrary, it may increase it, for the constriction on which the hypertrophy depends increases with the tightening of the fibrous tissue. Even the iodide of potassium which is administered for the cure of the syphilis may aggravate the swelling of the tongue.

Mercurial Hypertrophy.—The excessive use of mercury for syphilis and other affections tends to exaggerate enlargements from other causes.

CHAPTER XVI.

INNOCENT TUMOURS.

Congenital Tumours—Lipoma, or Fatty Tumour—Fibroma, or Fibrous or Fibro-cellular Tumour—Fibromyoma—Rhabdomyoma—Cartilaginous and Osseous Tumours—Amyloid Tumours—Angioma, or Vascular Tumours—Papilloma, or Warty Tumours—Adenoma, or Glandular Tumour—Keloid.

MANY of the affections which may be classified under the term innocent or benign tumours, have been described in former chapters: ranula, dermoid cyst, thyreoglossal tumours, lymphangioma.

The tongue is, unfortunately, much more often the seat of malignant than of innocent tumours.

1. Congenital Tumours.

Now that the structure of the tumours which are present at birth is for the most part known, the name has become too general a one. It would be difficult, however, to place under any other heading the exceptional case which Studenski described so well and illustrated so fully in 1834. It would now be called an included parasite, or embryonic mixed tumour, and was clearly most like sacrococcygeal and other similar tumours. The mother, between the second and third month of pregnancy, was frightened by seeing a dead horse with its tongue out. Whether this had anything to do with the disease or not, the child was born with its tongue pushed out of its mouth by a tumour situated in the middle line between the geniohyoglossi. The length of the tongue, including the tumour, was 6 inches 2 lines, its breadth 4 inches, its thickness 2 inches 2 lines. The child could not suck, and died in thirty-six hours. It had no other abnormality; the embryonic nature of the tumour is clear. An account of the comparative anatomy and development of the septum of the tongue

has been given in the first chapter (p. 10), as suggesting an origin for such tumours in embryonic rests. Other cases of mixed tumour may at first sight appear fatty, but on examination fibrous tissue, cartilage and bone have been discovered (*vide infra*).

2. Lipoma, or Fatty Tumour.

Excluding the congenital lipoma, which, as just mentioned, is often a mixed tumour, lipoma of the tongue chiefly appears in late adult life, even in men over sixty, seventy, or eighty. It appears under different clinical forms: (a) single and superficial, tending to become pedunculated; (b) single and deep-seated, in or beneath the tongue; (c) multiple; (d) diffuse.

(a) The most frequent form is single, situated on the border of the tongue near the tip, or on the dorsal aspect. The mucous membrane which covers it is almost invariably smooth, stretched, and devoid of papillæ when the disease affects the dorsum. It can be pinched up in folds over the tumour. The growth may be quite uniform, or lobed; it is generally so soft as to fluctuate, and, through the smooth, rosy membrane covering it, may be discerned a yellowish or golden hue, highly suggestive of the character of the tissue beneath. The rate of increase is so slow that ten, fifteen, or even more years may elapse before the tumour has attained the size of a walnut or pigeon's egg—a strange contrast to the rapid progress of a carcinoma of the tongue. The tumour, if left to itself, produces little inconvenience, and is not dangerous; even the surface seldom ulcerates. But when it has reached the size of a large nut, more especially when it projects in the form of a polypus from the dorsal border, it becomes inconvenient, is apt to be caught between the teeth, and is unsightly if the mouth is opened widely.

(b) A tumour grows in the depth of the substance of the tongue. But it grows so slowly that it cannot be mistaken for a gumma or sarcoma. It may protrude beneath the tongue, giving the appearance formerly called a double tongue. Here it will feel so soft as to resemble a ranula to the touch, but the golden yellow colour shining through the mucous membrane, which can be pinched up over it, clearly distinguishes the two without the need of a puncture. This form of lipoma seems to grow from the middle line, although

it may throw out lobules penetrating the muscles and appearing even beneath the skin below the chin.

The fatty tumour which most strongly suggests an origin from the structures described in the first chapter as connected with the development of the middle line of the tongue, is that recorded by Monod. A woman, aged twenty-six, had a tumour beneath the frænum of the tongue, which had been growing for six years. It projected about one cm., had a bluish and not a yellow tinge, and apparently fluctuated. The mucous membrane was incised and the tumour shelled out. It formed a cylinder, rounded at the two ends, about the thickness of the thumb, and five to six cm. in length, situated between the muscles. On section, it appeared grey and tough. The operation was done from the mouth, but pus collected, and a counter opening below the jaw had to be made.

(c) *Multiple lipomata* have been seen in old men by Barling and Chavasse. Barling's patient was aged seventy-five. The tumours had been noted by the patient, but he did not complain of them when admitted to hospital as a medical patient. They were discovered by chance. They were four in number, two on each side of the edge of the front of the tongue, varying in size from five inches to one inch in diameter. Chavasse found a number of lipomata in a man aged eighty-six. They had been noted by the patient for twenty years, and the largest had reached the size of a tangerine orange, without causing important trouble. The patient declined to have the large one removed. Cauchois saw multiple lipomata in a man aged fifty-three, affected with pulmonary, glandular, and cutaneous tuberculosis. There were fatty lobules on each margin and under the tip of the tongue, symmetrically placed, and extending deeply between the muscular fibres. There was also a lipoma in the neck. The patient was very anxious to have the tumours removed. This was partly done, but suppuration followed, and abscesses burst below the jaw, which continued to discharge until his death, three months after the operation.

(d) *Diffuse Lipoma*.—Perhaps the case just mentioned might be placed in this category rather than under multiple lipoma. A remarkable case of diffuse lipoma was shown at

the Laryngological Society of London. A diffuse lipoma of the parotid region had extended inwards behind the jaw, and spread along the side of the tongue beneath the mucous membrane.

The *diagnosis* of fatty tumour is made by noting its duration, its lobulation, its elasticity, pseudo-fluctuation or extreme softness, the displacement of its margin by pressure of the finger, the mobility and looseness of the mucous membrane over it, its particular hue. When deep-seated beneath the tongue the diagnosis can hardly be reached with certainty until an incision is made.

Treatment.—A fatty tumour need not be removed unless it gives trouble. A pedunculated tumour is removed by cutting through the pedicle and tying the vessel; the wound can then be closed by a suture. A deep-seated tumour is shelled out. Multiple and diffuse lipomata, especially in old people, seldom require active treatment.

3. Fibroma (fibrous or fibro-cellular tumour).

Perhaps a little more common than the fatty tumours of the tongue, to which they present many points of resemblance besides their rarity. They occur for the most part in adults, but may be noticed first in childhood, or may be congenital. They are situated on the dorsum much more frequently than elsewhere, and may occur on any part of the dorsum, even towards the root of the tongue, but, unlike the fatty tumours, they scarcely ever affect the under aspect. There may be one or several tumours; indeed, it is not unusual to see two or three, either separated by a tolerably wide interval, or lying side by side. It is probable that the fibromas, like the lipomas, commence in the substance of the organ, but as they increase in size, they project and often assume a distinctly polypoid form, on which account they have been not infrequently described as fibrous polypi of the tongue. They probably grow rather more quickly than the fatty tumours, but the rate of increase is very slow, and after many years a fibrous tumour may be no larger than a walnut. The fibrous polypi resemble, in every respect save one, the fatty polypi; they are composed of the softest varieties of fibrous tissue, and are rather fibro-cellular than fibrous. The mucous membrane covering them is smooth and stretched, and they

are so soft as to appear to fluctuate. The important exception is that they do not present the yellowish hue peculiar to the fatty tumours, and thus the diagnosis of one of these diseases from the other is made. But the deeper-seated fibrous tumours are much more difficult to distinguish. The mucous membrane over them may be tense and thin, but it is not adherent; the tumour is generally rounded, but may be lobed; it is firm, tense, elastic, so that it may be taken for a sac filled very full of fluid. Fibromas are very seldom either painful or tender; they are quite innocent, and give rise to very little inconvenience. But after a time they are irksome in speaking or in eating, and hence there comes a desire to be rid of them.

The *diagnosis*, as has been hinted, is not in every instance free from difficulty. The tumour may be taken for a cyst, and the error is only rectified by an incision. Even then some doubt may still remain. Sir James Paget kindly gave us the notes of a case in which, to make the diagnosis, he punctured such a tumour; some synovia-like fluid escaped, but finding that a solid mass remained behind, he cut it out and found it was a fibrous growth. No serious consequences are likely to ensue from an error in the diagnosis of a fibrous tumour.

The *treatment* is precisely similar to that recommended for fatty tumours, to cut off the polypoid growths, and to enucleate those which are more deeply placed through a single incision. The appearance after removal varies; it may be that of a dense mass of fibrous tissue; or of bands of firm fibres intersecting a softer, yellower, and more succulent material; or of such loose and oedematous tissue as nasal polypi are made of.

4. Fibromyoma.

Blanc described a pedunculated, pear-shaped tumour, the size of a large egg, which was attached to the base of the tongue and filled the pharynx. The finger was passed between the tumour and the epiglottis. The tumour was cut away with scissors. No important haemorrhage took place, and the patient was quite well five months later. The structure of the tumour was that of a fibromyoma. He also mentions another case.

5. Rhabdomyoma.

Pendl saw a boy, aged eight weeks, otherwise sound, in whom a tumour of the left half of the tongue had been noted at birth which prevented him from sucking and he had to be spoon-fed. The tumour slightly increased and commenced to ulcerate. It was, when removed, the size of a pigeon's egg, situated in the substance of the tongue, near but not quite reaching the left margin. Its surface was nodular; its consistence elastic, but not compressible; its colour pale red, except when the child cried, when it became bluish red. The tumour was circumscribed; the rest of the tongue was normal, and there was no sign of muscular macroglossia or general hypertrophy. At the operation the tumour was found to be circumscribed, but not encapsuled. The main part of it was composed of young, striped, muscular fibres, with normal connective tissue and blood vessels. There were no dilated lymphatics nor sarcomatous elements.

6. Cartilaginous and Osseous Tumours.

If one considers the cases of tumours in which cartilaginous substance has been noted, it is difficult at first sight to group them together. But if one assumes that what has been described as cartilage may not have been identical in all the cases, an explanation of the differences in the cases suggests itself. Perhaps in future cases more exact histological observations will be made with regard to the cartilaginous substances. The explanation suggested is that there may be different conditions under which a cartilage-like substance may occur: (a) Congenital tumours, containing true cartilage; (b) Tumours arising in scattered mucous glands, really endotheliomata, in which a cartilage-like substance forms—e.g. tumours identical with those arising in the submaxillary and parotid glands; (c) Amyloid tumours, containing cartilage and bone.

(a) *Congenital Chondroma and Osteoma.*—These are found in connection with the middle line of the tongue—in connection, doubtless, with the foetal structures which give rise to the septum (p. 10). Weber describes a case which he had seen of a girl, fifteen years old, who had a rounded, slightly nodular mass, about the size of a walnut, growing

in her tongue for eight or more years. It was composed largely of cartilage, but contained also a goodly quantity of fat and fibrous tissue. One cannot but suspect that the tumour in this case was of congenital origin ; first, on account of the extreme rarity of lingual chondroma in adult or almost adult age ; second, because two cases at least are described (Arnold and Bastien) of congenital tumours of the tongue which contained large quantities of fat mixed with cartilage and other connective tissues. Mikulicz and Kümmel mention two other cases.

(b) Cartilage-like tumours, mixed with fat, have been seen on the dorsum of the tongue near the root. They are not congenital, neither are there any foetal remnants in this situation ; but there are mucous glands scattered about, especially in front of the pillars of the fauces. The clinical and microscopical observations would accord with the supposition that they are similar to parotid and submaxillary tumours (p. 226). Berry described a tumour, the size of a hazel nut, taken from a man aged forty-nine. It had been growing on the right border of the tongue, midway between the base and tip, for five years, and was certainly not congenital. It was composed of firm, fibrous tissue with a nodule of cartilage in the centre. Lang saw an indolent, very hard tumour, the size of a hazel nut, on the dorsal aspect of the tongue, just to the left of the middle line, and nearer to the base than to the tip. It had been growing steadily for twelve years in a woman aged twenty-two. It had a broad base, was slightly elevated, with the mucous membrane intact. It was removed, under cocaine, with trifling haemorrhage. The wound was sutured and healed by first intention. The tumour contained cartilage, bone, fibrous tissue, and fat.

7. Amyloid Tumours.

They were first described by Ziegler in 1875 in a patient who had died of chronic bronchitis and emphysema with a syphilitic liver. There were three large nodules and other smaller ones at the base of the tongue behind the circumvallate papillæ, partly pressing on the epiglottis.

Schmidt has described two more cases ; he identified the amyloid substance both by the iodine and by the gentian

violet reaction. One patient had died of bronchitis and emphysema. Between the circumvallate papillæ and the junction of the palatoglossal fold with the tongue was a hard, slightly prominent tumour, circular in outline, 15 mm. in diameter, covered by intact mucous membrane; another 9 mm. long by 5 broad, both 8-10 mm. from the epiglottis. The yellowish waxy amyloid substance was not sharply defined, but extended into the muscle fibres around; the hard part was composed of cartilaginous material, some of which was calcareous; other nodules were bony without showing marrow spaces.

The second patient had died of emphysema, signs of old pleurisy, ulceration of the stomach, and heart disease. In the right half of the base of the tongue was a hard nodule about 9 mm. in diameter, situated about 2 mm. from the middle line, having the same yellowish waxy character, with small islands of bony substance containing bone corpuscles and canaliculi.

These amyloid masses have always been met with at the base of the tongue, just in front of the epiglottis, in patients dying of diseases in which amyloid degeneration occurs; and the cartilaginous and bony nodules in the waxy substance are similar to those met with in the trachea and bronchi, etc. As distinct from an enchondroma, these amyloid masses are not encapsulated.

8. **Angioma, or Hæmangioma; Vascular Tumours.**

These are benign tumours composed of blood vessels, more or less dilated arteries, capillaries, or veins, without any new growth between the blood vessels and without any dilatation of lymphatics. The blood tumours may remain stationary, or enlarge only from the pressure of the blood within, but do not show that tendency to continual extension and enlargement of the tongue characteristic of lymphangiomata. The tumour may at first appear to be only a nævus, but later show lymph vesicles. Under these circumstances, the lymphangiectasis should be considered as the essential feature, and the tumour should be classed as a lymphangioma. Vascular tumours only cause trouble by their size, and by bleeding, when the surface has been injured. The angioma may be divided into: (*a*) arteriovenous, pulsating aneurysms;

(b) cirsoid aneurysms, or aneurysms by anastomosis; (c) capillary nævi; (d) venous nævi, or cavernous tumours, which are the most frequent.

(a) *An arteriovenous aneurysm* may form after an injury, such as a punctured wound under the chin. Després saw an arteriovenous aneurysm of the floor of the mouth of a girl, aged sixteen; it had commenced when she was twelve, and showed itself by its pulsation and thrill. Both lingual arteries were ligatured, and this led to some improvement, but a thrill remained, for which pressure on the carotids was tried at intervals.

A pulsating tumour may be quite small, as in Gay's case, where the tumour was the size of a pea, situated near the tip. It had existed six months, when it began to bleed spontaneously.

(b) *Cirsoid Aneurysm, Aneurysm by Anastomosis; also Teleangiectasis, or Plexiform Angioma.*—A few instances have been recorded in the tongue. The tumours are more definitely circumscribed than venous nævi, and the vessels possess a distinct wall.

In a case related by Bryant the tumour occupied the tip and right side of the anterior half of the tongue. These parts were congested, swollen, and covered with large full veins, while great tortuous arteries could be felt running up from the base of the tongue to supply the tumour. It could readily be emptied by pressure, but filled again the instant the pressure was removed. It was not treated. In a case related by Fayrer, the tumour occupied the situation of a ranula, and at first looked not unlike a ranula; but, when closely examined, it was found to have a tortuous, lobulated configuration, and it pulsated strongly. It was as large as a small orange, had existed eight years, during which time it had on several occasions bled violently, and it was said to be steadily increasing. Fayrer punctured it, and a jet of arterial blood spouted up through the opening. He then injected it with a strong solution of tannic acid; the haemorrhage and pulsation were immediately arrested. The tumour continued to consolidate during several days, when the man, a native Indian, discharged himself from the hospital, and was not seen again.

by the surgeon. Both these patients were males, one of them thirty, the other forty, years of age.

Mott also described an aneurysm by anastomosis on the left side of the tongue.

(c) *Capillary Nævi*.—Small congenital nævi, similar to those seen on the skin, also occur on the tongue. They are often multiple, occurring on different parts of the body as well as on the mouth and tongue. In Mendel's case there were numerous nævi on the lips and cheek, and also on the tongue in front of the V. Reinbach saw a pair of congenital nævi, one on either side of the frænum. These nævi are said to arise in the line of the fissures of the embryo. As often as not, they are seen at a distance from any fissure. To accord with the fissure theory, the capillary nævi should be seen in the middle line or else along the line of the V, which is by no means the case, unless some secondary displacement is assumed.

A port-wine stain on the face, nævus vasculosus, may be continued into the mouth.

Acquired Capillary Nævi.—Treves has described three cases, all in adults (two appeared in women during pregnancy), in which capillary nævi first appeared long after puberty and caused haemorrhages. His first case was that of a healthy, rather plethoric, man, aged fifty-seven, who had suffered from epistaxis since childhood. Several members of his family, his grandfather (died aged eighty-one), his father, two uncles, and two brothers, his son, and two daughters, all had suffered from recurrent attacks of haemoptysis, but there was no distinct history of haemophilia. The man's epistaxis recurred every two to six weeks, preceded by headache. Four years before Treves saw him he began to bleed from the tongue, and had not since then suffered from epistaxis. The bleeding had increased of late, so as to render him anaemic. The tongue, otherwise normal, had nine bright red tumours dotted about, the largest the size of a split pea, the smallest that of a pin's head, the colour of which disappeared on pressure. The haemorrhage was arterial and spontaneous, on or after eating. The tongue was painted with chromic acid, 10 per cent., which stopped the bleeding from the tongue,

but the epistaxis returned. The second patient, a woman, aged thirty-one, had suffered from occasional attacks of headache which quite prostrated her. She had always lost much at each menstrual period, but had no piles or varicose veins, and had never bled from the nose. The bleeding, which was often severe, came from a tumour, not unlike a raspberry. It had no visible pulsation, and could be easily reduced to a mere tag by pressure. It had grown without pain during her last pregnancy. The haemorrhage was always spontaneous, and sometimes alarming in amount. Since the bleeding she had had no more headaches. The tumour was snipped off and the base cauterised. Under the microscope the tumour appeared a pure arterial angioma.

Butlin had a similar case under his care in St. Bartholomew's Hospital. There were several tiny, bright-red spots on the dorsum of the tongue of a married woman, and one larger place about the middle of the fore-part of the tongue, which formed rather a depression or small cavity than a tumour. Profuse bleeding occurred from these bright spots, especially from the largest place. The tiny spots precisely resembled the tiny nævi which are seen on the septum nasi in certain persons who are liable to frequent attacks of epistaxis. The galvano-cautery sufficed for the cure of the little nævi, as it does for those in the nose.

(d) *Venous Nævi or Cavernous Tumours.*—Venous angiomas are generally congenital, but this is not invariable, for, if their history is to be credited, they originate occasionally in the tongues of adults. They may occur singly, or to the number of three or four or more; and, in either case, are situated generally on the dorsum, more often in the anterior than the posterior half. There they project slightly above the surface, lifting up and thinning the mucous membrane over them, and generally showing a dull blue or livid colour through the thinned membrane. As in the integument covering many of the external nævi, so in the mucous membrane covering the lingual nævi, small varicose vessels and vascular spots may be observed. In some instances the contents can be slowly pressed out of the

tumour, but in other instances the mass feels tense and elastic, like a thin cyst tightly filled with fluid, and cannot be reduced even by firm and long-continued pressure. Nævi of the tongue are seldom very large, not reaching usually to the size of a large nut. They are usually quite painless, and give rise to no inconvenience save by their bulk; yet they may bleed, and if by misadventure they have been pricked, may bleed profusely and repeatedly.

Venous nævi are generally circumscribed, and are supplied by an afferent artery and efferent veins. The vessels and the blood spaces have developed a distinct tumour, so that if injected through the artery, the injection fills the spaces and escapes by the veins, but does not spread to the capillaries of the surrounding tissue.

A nævus, though congenital, may give rise to no trouble during the life of the patient. Or, it may begin to grow larger during adult age, and may on that account need treatment. The most formidable case occurred in a man, forty-six years old, who came to Butlin from the hot regions of Australia, where he had lived for many years, and had been accustomed to drink freely. All the anterior two-thirds of the tongue was transformed into a huge cavernous nævus. He said the condition was congenital, and a similar nævoid condition of the lower lip made this very probable. During the last few years the tongue had slowly grown larger, and nine weeks ago it had become painful and ulcerated. The pain and the fear of fatal haemorrhage had forced him to seek for relief by operation. The whole of the anterior two-thirds of the tongue was removed, after a ligature had been tied round it behind the line of incision. The patient made a good recovery, and was quite well when seen some years later. The specimen is preserved in the museum of the Royal College of Surgeons (No. 2267).

In Hulen's case the tumour had existed for twenty years in a woman aged forty-three, and had not varied at all during that time. It could be emptied by pressure, and refilled without thrill or pulsation.

Carter described a well-marked instance of the late development of a cavernous nævus. A man, aged fifty, had a tumour occupying the right half and the tip of the tongue.

It had commenced spontaneously ten years before, about the middle of the right border, and had grown rapidly during the last six months, unaccompanied by symptoms. It could be emptied by pressure and refilled without pulsation. After removal the tumour, preserved in spirit, measured $3\frac{1}{2}$ inches by $\frac{1}{2}$ an inch. It was covered with enlarged filiform and fungiform papillæ, below which was cavernous tissue with a few muscular fibres.

What at first seems to be only a nævus may afterwards prove to be essentially a lymphangioma. Bryant has described this change in a case he had unusual opportunities of watching. The diseased portion of the tongue became tolerably firm and harder in some places than others; the surface changed and looked like being made up of vesicular warts, the vesicles being filled with clear or bloodstained serum (Pl. VII., Fig. 2). The growth continued in the deeper parts, while fresh tumours continued to form in the vicinity. A painless, ill-defined swelling appeared below the jaw, which, when punctured, yielded a thin, watery, highly albuminous fluid. This case clearly shows the steady advance of lymphangioma to produce marked macroglossia.

A nævus may become partly obliterated by fatty degeneration.

A nævus is usually very *easily recognised*. Its situation on the dorsal aspect of the tongue, its bluish colour, its soft consistence, the ease with which it can usually be diminished in size by pressure, the rapidity with which it refills, and the appearance of vessels and vascular points upon its surface, permit no doubt to exist regarding it.

Unless a lingual nævus is obviously diminishing in size, and there is thus a reasonable prospect that it will undergo spontaneous cure, it should be treated, and the earlier the *treatment* is undertaken the better. Small superficial nævi may be cured by destroying them with the actual or, far better, the galvano-cautery. Even nævi as large as a small nut may be easily destroyed by two or three applications of the galvano-cautery; the point of one of the platinum instruments should be made to penetrate deeply into the substance of the growth and moved in all directions through it until it has been completely broken up. The swelling and inflam-

mation which follow this operation are comparatively trivial, and the nævus is sometimes cured by a single application. If it shows signs of returning vitality the operation must be repeated. If a dull red heat is employed there is no haemorrhage.

The application of ligatures *en masse* was formerly employed, and was exceedingly painful; it was followed by sloughing of the tumour beyond the ligatures, which set up, in many cases, fatal septic pneumonia. This plan has been, or should be, entirely discarded.

In an infant, aged four months, Heaton found the tongue swollen and protruded from the mouth, causing dyspnœa, owing to a venous nævus. Electrolysis led to no improvement; ligature of both lingual arteries caused a temporary reduction, but swelling recommenced and death followed from asphyxia six months afterwards.

The most satisfactory operation is excision, keeping outside the margin of the vascular tissue, where the vessels can be usually caught and tied. If a wedge-shaped incision can be made, the wound may be drawn together and the oozing checked by pressure. In some cases where there is much oozing excision may be done with the cautery knife at red heat, or this may be used to sear the cut surface. Excision is always necessary where there is any sign of lymphangioma. For very diffuse venous nævi, arteriovenous aneurysms and cirsoid aneurysm, a preliminary ligature of the linguals may need to be adopted; then the angioma may be excised, or treated by electrolysis at several sittings, the ligature of the arteries alone being insufficient to arrest its development.

9. Papilloma (warty tumour).

Warts and warty growths are among the more common of the innocent tumours which affect the tongue. They occur most frequently upon the dorsum within the papillary area, and are then doubtless due to hypertrophy of the natural papillæ; but they are not limited to the papillary area, and may even grow on the under aspect where the mucous membrane is quite smooth. They may occur at any age, and are not uncommonly congenital. A remarkable case occurred in a little boy who was a patient in St. Bartholomew's Hospital some years ago. He had a warty enlargement of all

the fungiform papillæ of his tongue; there was not one of them, so far as we could judge, which was not hypertrophied and warty. Each fungiform papilla stood up on the surface of the mucous membrane as a small white papillary tuft. So, at the Hospital for Sick Children, a little warty tumour was seated sessile on the under aspect of the tongue of an infant ten months old. It projected to the left of the frenum in the groove between the tongue and the floor of the mouth.

Papillary growths are almost always compound (Fig. 24); they may be either single or multiple.

Under the name of papilloma, cases are also recorded which come under the heading of glossodynæ or neuralgia of the tongue. Papillæ, sometimes fungiform, sometimes in the region of the foliate papilla, become swollen and are extremely painful.

Other papillomata are due to irritation, and occur on each side of the frenum in children, owing to the contact of the under-surface of the tongue with the sharp incisor teeth during whooping-cough, etc. They have been called on the Continent Riga's disease.

A remarkable tumour was seen by Vincent in a child two months old. It formed a large mass, thicker than the tongue on which it grew, and consisted of exaggerated papillæ on the surface and of fibrous tissue beneath, giving a sensation of wooden hardness.

But the chief interest in connection with papillomata is to be found in those sessile warty growths which form on tongues which are leucomatous or the seat of chronic superficial glossitis. Several of them are figured in the plates (V., VII., VIII.). They look, at first, much like an extra thick patch of leucoma, but as they grow larger and more prominent, the warty character is more pronounced. They will be again referred to in the chapters on carcinoma of the tongue, for they are so invariably the actual precursors of cancer in such tongues, that we believe every such warty growth becomes cancerous if it is left untreated. As they grow larger, they also become more fixed, and induration gathers about the base. This is the earliest indication of the change to cancer; but it is impossible

to tell the precise moment at which the innocent growth becomes malignant.

The *diagnosis* of a papilloma, in most instances, presents no difficulty. In children and young persons it can only be mistaken for a condyloma. We have more than once



Fig. 24.—PAPILLOMA.

Photographed from a vertical section through a papilloma removed from the tongue by Spencer.

It is composed of elongated papillæ with thickened epithelium, which is also thickened on the pedicle and on the surface of the tongue beyond. The centre of the pedicle is composed of fibrous tissue. This case would probably have soon become epitheliomatous so as to resemble Fig. 25, p. 319.

seen a warty syphilitic growth on the under aspect of the tongue, where it was out of reach of injury or irritation, so like a papilloma, that we doubt whether the diagnosis could have been made unless a clear history or some other signs of syphilis had been present. On this account it is always well to examine the patient closely for syphilitic symptoms, especially if he is a young adult and the tumour has not existed very long. The syphilitic growth rapidly disappears under the local application of a ten-grain solution of chromic acid; but we are not aware that the acid produces any effect on a true papillary growth.

In persons more advanced in life, especially in men, and more especially in those who suffer from chronic superficial glossitis in any of its forms, it is exceedingly difficult to make the diagnosis between a simple warty growth and an epithelioma. The absence of ulceration, of fixity of the tumour, and of induration about its base, indicate an innocent growth. The presence of these signs make it almost certain that the disease is already malignant. Even a microscopic examination will hardly discover the difference, in the transition period from the one to the other. Yet the diagnosis is important; for, although removal without delay is the treatment for both diseases, the extent of the operation is very different in the two cases. The innocent growth may be removed with only the base on which it grows. The malignant growth calls for the removal of a wide area of the surrounding tissues.

The *treatment* of papillomata is very simple. They should not be allowed to remain, and should not be treated with caustics, unless the caustic is applied in such a manner as to completely destroy the tumour. They can be readily destroyed with the galvano-cautery if they are of small size; or they may be removed with the galvano-cautery loop. The pain of the operation may be allayed by painting the tongue freely with a 20 per cent. solution of cocaine. The operation is not imperative in children and young persons, although it is very desirable, even in them, to get rid of a disease which tends to grow slowly larger, and which is likely, in later adult age, to form the foundation of malignant disease. In persons over thirty years of age the sooner all such growths are taken away, the better. If the tumour is very small, and of recent growth, in an otherwise healthy tongue it may be taken away with the galvano-cautery loop, which should enclose the surface on which the wart stands. There will then be no fear of recurrence. For all large growths, and for all suspicious growths, and for all papillary growths on diseased tongues, the only safe operation is the removal of the tumour with a wider base than that on which it stands. And the best way to perform this is to cut out the base by two elliptical incisions which pass deeply down into

the substance of the tongue, so that the edges of the wound can be brought together by sutures and healing by the first intention can be secured.

10. Adenoma, or Glandular Tumour.

There are no tumours of the tongue to which the name of adenoma properly belongs, except it be to those occasional tumours which arise in the mucous glands. These are referred to in Chapter XII. Besides those which grow in the glands beneath the tongue, hypertrophy of Blandin's gland beneath the tip of the tongue has been seen, also of glands on the back part of the tongue in front of the anterior pillar of the fauces. As to those tumours which have been described as adenomata, the insufficiency of the histological description prevents one from identifying them.

11. Keloid.

The only case of keloid with which we are acquainted is that related by Sedgwick in the Pathological Transactions for 1861. The patient was a little girl, between four and five years old, who had patches of keloid on several parts of the body. A short time before her case was brought before the Society a patch appeared on the right side of the tongue, and quickly spread along the upper margin towards the tip. It looked, when the tongue was protruded, like the contraction consequent on some surgical operation, or a severe burn, or the application of some corrosive to the part. It was very little indurated. Sedgwick regarded the disease as a good example of Addison's keloid. A case, which appeared to be somewhat similar in kind to this, was under the care of Mr. Morrant Baker, in St. Bartholomew's Hospital, in 1881. The patient was a healthy-looking man of twenty-three years old, who had on the left border of his tongue a perfectly smooth concave depression, surmounted on the dorsal aspect by a very smooth curved border raised to the extent of an eighth to a quarter of an inch, and slightly everted. The border was a little firmer than the surrounding parts, otherwise there was not any induration. The disease was said to have followed a bite of the affected portion of the tongue. Mr. Baker removed the disease, with about a quarter of an inch of the adjacent tissues, but we are not aware whether it recurred.

CHAPTER XVII.

MALIGNANT CONNECTIVE-TISSUE TUMOURS, OR SARCOMAS.

Tumours not proved to have been Sarcomas—Varieties of true Sarcomas : (a) Sarcomas relatively benign without glandular enlargement; (b) Malignant Sarcomas involving Lymphatic Glands; (c) Small Round-celled Sarcomas or Lymphosarcomas at the base of the Tongue; (d) Sarcomas following Congenital Lymphangiectasis; (e) Sarcomas connected with Mucous and Salivary Glands; (f) Secondary Sarcomas—Diagnosis—Causes—Prognosis—Treatment.

1. Tumours not proved to have been Sarcomas.

A CASE was reported by Professor Jacobi, of New York, in the American "Journal of Obstetrics," for 1870. The tumour was congenital, about the size of a walnut, seated in the dorsal aspect of the tongue, quickly growing. It was elastic, rounded, deeply grooved, and ulcerated. In colour it was bright red, being covered by a very large network of capillaries. It was removed successfully with the galvano-cautery, and after removal was found to consist partly of round, but chiefly of spindle cells. There is doubt whether this was in truth a sarcoma; it might have been composed of embryonic tissue on account of the extreme youth and immature condition of the infant. On further consideration, Jacobi's case would appear to be one of angioma or fibrous nævus. Another case was that of a patient under the care of Godlee, in University College Hospital. The tumour was seated on the dorsum of the tongue, was somewhat pendulous, and recurred after it had been removed. Later there appeared several growths on the skin of different parts of the body. Barker mentions the case, and suggests, what is by no means improbable, that it was really a case of multiple sarcomata.

In the previous edition no attempt was made at a general description of such a rare affection as sarcoma of the tongue;

but public attention having been drawn to the matter, a number of cases have been recorded under the heading "Sarcoma of the Tongue." They appear, however, to be of very different quality, and we are doubtful whether they can be properly classed under one name, unless it be that of "malignant connective-tissue tumour."

Under the name of "sarcoma of the tongue" Marion has collected twenty-four cases, yet one must express astonishment at some both of his inclusions and exclusions. Of course, it is impossible to review with certainty the conclusions reached, and the names given to cases of an earlier date, in some of which a first-hand account has not been available. All that one can do is to exclude from the category of sarcomas those cases in which there is no sufficient proof that the tumours were really malignant connective-tissue tumours.

Marion specifically excludes the cases of small round-celled tumours, in which mention is made of a fine reticulum between the cells, saying that they grow from the lymphadenoid structures at the base of the tongue. On the other hand, he includes such tumours in his list when no mention is made of an intercellular reticulum. But the microscopical descriptions of the tumours removed have usually been very brief, and unless the sections were carefully examined, *e.g.* by first getting rid of most of the small round cells, the existence of a reticulum may have been overlooked. Whilst not including Hutchinson's and Eve's cases of lymphosarcoma, Perman's case is reckoned as one of sarcoma. Surely the account given by Perman shows that his patient had hypertrophy of the lingual tonsil. A woman, aged thirty, had pains in the throat and a little occasional bleeding. A swelling at the base of the tongue was seen by the laryngeal mirror. The cautery was first applied, later on portions were snared off, and pyoctanin injected, followed later by the removal of further pieces with the snare. After four months of this treatment there was still a swelling at the base of the tongue which gradually subsided.

Onodi's case is also included by Marion amongst the sarcomas. A girl, aged fifteen, had a tumour at the base of the tongue the size of a small nut, which had been noted six months before. A small piece was removed, and a month

afterwards the condition was unaltered, the hollow remaining from which the piece had been removed. It is not a character of sarcoma to remain stationary after a piece has been punched out of it, and the case accords with hypertrophy of a lymph follicle.

Even the irritative tumours on either side of the frenum of children (Riga's disease, page 294) have been included among the sarcomas by Marion and Targett.

There are also cases named sarcoma the description of which is similar to that of others called hypertrophied papillæ, or pedunculated fibromas. Mercier's case, which is called a spindle-celled sarcoma, was a mushroom-shaped tumour which had existed eight years. It formed a tumour the size of a large nut, composed of spindle cells with fatty degeneration in the centre. The tumour had been stationary for the four months preceding its removal. Mikulicz and Michelson in their Atlas (Taf. xxxv.) describe a small pedunculated tumour, 1·5 cm. in diameter, of three months' duration. Its pedicle, which was 5 mm. in diameter, was quite superficially attached. It was cut off and the attachment burnt with the cautery.

It is impossible to say that some of the cases recorded long ago were not sarcomas, but one cannot accept the statement that Heath's case was a sarcoma. Marion places it at the head of his list as a round-celled sarcoma. Heath described the case as one of medullary cancer, but we have elsewhere given reasons for believing it to have been an epithelioma.

Another case included as sarcoma by Marion is one briefly mentioned by Hueter in 1869. A tumour the size of a hazel-nut had been removed from a woman in the seventh month of pregnancy, after it had been noticed two months. Nothing is mentioned about a microscopic examination, nor even that the question of its being a gumma had been considered and excluded by treatment.

Bleything has recorded, under the name of sarcoma, an ulcer which was probably due to chronic traumatism. A young man, aged seventeen, developed an ulcer on the tip of the tongue, which was attributed to cigarette smoking. It was cauterised with nitrate of silver, and the ulceration and

induration increased. A piece was cut out for diagnosis, and then the ulcer was excised, and was stated by Delafield to be a round-celled sarcoma. Six years later the tongue showed simply a linear scar.

The so-called sarcomas of the tongue of cattle are now known to be due to actinomycosis.

Having therefore shown upon what doubtful grounds many cases have been called sarcoma, one passes to those which appear to be correctly described under this name. In doing so one may observe that sarcomas of the tongue as a whole cannot be regarded as much less malignant than epithelial cancer. Some are as malignant as the most malignant cancer; others are very favourable for removal, especially when encapsulated or, at least, circumscribed. They are composed of round or spindle cells. The round cells in some are large; in the tumours growing from the base of the tongue the cells are small, the tumours being called also lympho-sarcomas. But the small round-celled or lympho-sarcomas are not confined to the base of the tongue.

The sarcomas which have been hitherto described fall into several groups.

True Sarcomas.

(a) *Sarcomas of a relatively benign character* arise in the muscular substance of the tongue, causing a smooth elevation of one or both sides, without glandular enlargement.

A case of small round-celled sarcoma was seen by Butlin in a man, aged forty, who had not had syphilis. He had smoked cigars, but not a pipe. He had noted the tumour as well as a soreness for two months, and had been treated with iodide of potassium unsuccessfully. The left half of the tongue was enlarged by a tumour the size of a fives ball, without ulceration of the surface. Beneath the jaw the submaxillary gland was enlarged and hard. The left half of the tongue, to which the tumour was entirely limited, was removed, and the tumour found to be of a soft consistence, white colour, circumscribed, but not actually encapsulated, and composed of small round cells. The enlargement of the submaxillary gland subsided when the pressure on the duct was removed. No recurrence had taken place some years later. The tumour is preserved in the museums

of the Royal College of Surgeons and St. Bartholomew's Hospital. Dunham has described a case of large round-celled sarcoma. It occurred in a man, aged sixty-one, who was a moderate drinker, but had smoked much. A brother and sister had died of tuberculosis eight months before. The tumour grew until it reached one inch and a half in diameter, on the right margin of the tongue opposite the first bicuspid tooth. The epithelial surface was intact, although the patient said that he had bitten his tongue, and that a blister had been raised by the irritation of decayed teeth. After removal an examination confirmed the unaltered condition of the surface, and there was no down-growth of epithelium into the sub-epithelial tissues. The tumour was composed of cells of a large size lying amongst a delicate fibrous reticulum of small amount; there were no spindle cells; glandular enlargement was absent. Abbe removed, under cocaine anaesthesia, a mass which had been growing some years buried in the dorsum of the tongue, and had reached to the size of the end of the thumb. It was found to be a vascular sarcoma.

Barling in 1896 operated upon a similar case to Butlin's, and he has informed us by letter that his patient is alive and well three and a half years after the operation. A woman, aged thirty-five, had noticed a small swelling on the tongue four months before operation. It grew in spite of the administration of iodide of potassium, until an elastic, round swelling occupied the left half of the tongue, extending up to the septum, and bulging both on the upper and under surface. It was not very tender; the surface showed no inflammation nor ulceration of the mucous membrane. The tongue was quite free, and no glands were enlarged. A piece was excised for microscopic examination, and the growth rapidly fungated through. The left half of the tongue was removed, and a tumour was found embedded in it the size of a large horse-chestnut, having a distinct capsule, and being easily enucleated. It was moderately firm, not brain-like. On microscopic examination it proved to be a round-celled sarcoma.

(b) *Malignant Sarcomas involving Glands.*—A second group have shown themselves to be malignant, recurring, and requiring more than one operation; or recurring and

spreading to the glands in the neck, ultimately terminating fatally. Mikulicz has illustrated in his *Atlas* (*Tafel xxxvii.*) a spindle-celled sarcoma occupying the anterior third of the tongue on both sides, which had been noticed for six months. The diseased portion was amputated, but recurrence in the glands required a second operation six months after the first one, and a third six months after the second. Two years after the third operation ulceration occurred in the scar, but following the removal of carious teeth the ulcer healed.

Marion describes a similar spindle-celled sarcoma operated upon by Berger. A youth, aged seventeen, had noticed that for six months he often bit the side of his tongue, and for two months a small tumour had been growing on the edge of the tongue. The projecting portion, about the size of a nut, was somewhat pedunculated, but there was also an extension into the substance of the tongue. This was freely removed, along with a certain amount of healthy tissue around. A month afterwards there was recurrence in the scar, with enlargement of the glands below the jaw; consequently the submaxillary glands were removed on both sides, also the submental glands, the left cheek divided, and the sarcoma very freely removed from the tongue. The recurrent tumour was of the same structure as the primary growth—viz. spindle-celled sarcoma. Only an inflammatory change was perceived in the enlarged glands. A month later there was again a recurrent tumour in the scar the size of a pigeon's egg, but no fresh glandular enlargement. This tumour was again freely removed, after dividing the cheek and, this time, also the lower jaw. Two centimetres of healthy tissue around the tumour were included in the excision, which was done by the cautery. A month later a small tumour had formed again in the scar, and grew rapidly at first, then came to a standstill. After three months it began to get smaller, and after six months had quite disappeared, leaving an indurated scar. Healing was considered to be definite eleven months after the commencement of the primary tumour.

An element of doubt is thrown upon this case by its termination. All the recurrent tumours resembled the primary one in their clinical characters, and appeared within a month of the operation. The last formation was evidently

inflammatory ; so also were the enlarged glands removed at the second operation. Hence it may be questioned whether the primary tumour and the two first recurrent ones were really "malignant connective-tissue tumours."

Targett records the case of a man, aged sixty, who, a year before, had noted a tumour the size of a horse-bean which continued slowly to increase. A globular non-fluctuating tumour was found on the left side of the frænum, and a mass harder than the substance of the tongue extended back to the last molar tooth and caused a swelling to be felt bimanually in the submaxillary region. The surface was not ulcerated. Deglutition was not impaired. Antisyphilitic treatment had no result. The left half of the tongue was removed. Fifteen months later there was a large recurrent mass beneath the jaws, and symptoms suggesting secondary growths in the lungs. The tumour, when examined, was found to be embedded in the muscular substance of the tongue, being well defined but without a distinct capsule. It was very soft and vascular, composed of small round cells, remarkably uniform in size. There were broad strands of muscular fibres with vessels, or degenerated fibres between portions of the new growth. A more malignant case still has been fully described by Littlewood. A patient, aged seventeen, had been quite well until March 21st, 1896, when he scalded the dorsum of his tongue whilst eating a potato pie. A "sore place" formed, which never healed up. On April 12th there was an ulcer the size of a sixpence, and growth continued in spite of treatment. On July 28th a tumour occupied the middle of the tongue, nearly filling the mouth, so as to render articulation difficult, and mastication and deglutition well-nigh impossible. There was ulceration on the surface. On August 1st the tongue was removed by Syme's operation, and on August 23rd enlarged glands from both sides of the neck. The left tonsil and then the fauces became invaded, then other glands in the neck ; also a mass formed in the left temporal muscle. The patient died on December 29th, *i.e.* nine months after the scald. The growth was a medium-sized round-celled sarcoma, with many cells in active division, and numerous and extensive haemorrhages.

(c) *Small round-celled Sarcomas or Lymphosarcomas at the base of the Tongue.*—These sarcomas are distinguished rather by position than by other features from those which have been mentioned before, although all appear to be of one kind, small round-celled sarcomas. Cases of spindle-celled and large round-celled sarcoma do not seem to have been met with in this position. A microscopical examination does not afford a distinction between hypertrophy of the lingual tonsil and lymphosarcoma. As to the term lymphadenoma, it is doubtful whether confusion is not promoted by its use. The name might be applied to a tumour steadily growing on the base of the tongue with enlargement of the glands in the neck, but arrested in its development and disappearing under the use of drugs, such as iodide of potassium or arsenic. Unfortunately, this result does not appear to take place; such a growth may be temporarily, but not permanently, checked by such means.

A small round-celled sarcoma or lymphosarcoma causes a growth at the base of the tongue with a variable degree of malignancy, which spreads to the fauces and to the deep glands in the neck. Only in the early stages, and in the more benign forms, is it limited to the base of the tongue. Unfortunately, recurrence sets in after operation, however extensive. Some of the cases which have recovered are reported so soon afterwards that information as to the ultimate result can only be conjectured.

Hutchinson has described very fully the case of a medical student whose father was a medical man. Nothing wrong was noticed with the tongue until he was ten years of age, when a rough papillary growth was seen on the base of the tongue. This gradually became a large mass which filled the mouth and hindered speech. The tumour was nodular, like a mulberry, but there was no ulceration or involvement of the mucous membrane. There was no pain. The patient was observed for a year, during which there was no great advance except for the difficulty caused in speaking. The tongue was then removed close to the epiglottis, after tracheotomy, and rapid healing followed. He remained well for two years, and then a recurrent growth rapidly sprang up in the mouth and caused death by

haemorrhage. The tumour was situated in the posterior third of the tongue. It had a mammillated surface the size of a crown-piece, and the diameter was two and a half inches. It was divided up by fibrous bands into lobes, the whole being enclosed by vascular fibrous tissue with muscle fibres, but no definite capsule. Between the fibrous bands the lobes were composed of small round cells. There were no cysts nor erectile tissue.

Schulten removed such a tumour, the size of a fowl's egg, from a woman, aged thirty-two, which had filled the pharynx and rendered deglutition impossible. After tracheotomy an incision was made above the hyoid bone, both lingual arteries ligatured, and the tumour removed without difficulty. Healing was completed in seven and a half weeks. In Meyer's case the tumour involved not only the base of the tongue, but extended to the adjacent portion of the pharynx and epiglottis. Some enlarged and soft glands were removed along with the whole of the tongue, and part of the pharynx and epiglottis, after tracheotomy and ligature of the external carotid. The patient was exhibited healed. Albert removed the whole tongue through a submaxillary incision for a tumour which filled the fauces and prevented deglutition. It had been growing one year in a woman, aged fifty-six. Death occurred on the eighth day from pneumonia. The tumour was a small, round-celled sarcoma. Scheier gives a fuller account of his case. A woman, aged twenty-eight, had a rapid growth at the base of the tongue which extended to the pharynx. The tongue was removed, but all the glands in the neck became quickly invaded with the same lymphosarcomatous growth, and death ensued eighteen months after the commencement.

(d) *Sarcomas following upon Congenital Lymphangiectasis.*—In the two following cases there seems to be clear evidence that the sarcoma was preceded by a condition of congenital lymphangiectasis, from which a small round-celled sarcoma or lymphosarcoma started.

In the College of Surgeons' Museum there is a Hunterian specimen (No. 2269) which has been described by Eve. It consists of a tongue with a round tumour on the left side of the base covered by normal mucous membrane. The

tissues around, including the glottis, are œdematous. Microscopically the tumour consists of fibrous tissue, with masses of lymphoid cells between, with largely dilated lymphatic spaces. Perkins describes one which had the same origin. At four years of age a boy had a projection the size of a pin's head on the upper surface of the tongue. At twelve years the tumour had grown to the size of a walnut, projecting on the upper surface and bulging underneath the tongue. It then ceased to grow until twenty-five, when it was removed locally. In a year it began to grow again, so as to fill the mouth and cause a subluxation of the jaw when the mouth opened, but the growth was still wholly within the tongue and had not yet involved the floor of the mouth or the submaxillary glands. The anterior three-fourths of the tongue were removed through the mouth, the line of division being three-quarters of an inch behind the tumour. He remained free for one year and a half, and had then recurrence in the stump and enlarged lymphatic glands in both submaxillary regions. He declined further operation. The tumour was a fibro-sarcoma; fibrous bands divided it into lobes, with masses of small, rounded cells between the bands and isolated connective tissue fibres amongst the small round cells. Although no dilated lymphatic spaces are mentioned, the clinical history and a comparison with the previous specimen described by Eve suggest an identical origin.

(e) *Secondary Sarcoma of the Tongue*.—James records one secondary to sarcoma of the œsophagus. A white, soft new growth encircled four inches of the lower part of the œsophagus: it was composed of alveoli packed with spindle-shaped cells, whilst a similar growth was found in the tongue and in the glands of the neck. The disease had been noticed three months.

On the *diagnosis* and *treatment* of sarcoma of the tongue it is yet too early to speak. It will be evident to whoever studies the subject that masses which are not even new growths, tumours which have not originated in the tongue, tumours which have no real pretensions to be sarcomas, have been grouped together under the common heading of sarcoma of the tongue. We have endeavoured to

sort out the truth from this confused mass of material, and to place it before the reader in a clearer light. But we cannot pretend to lay down any directions for the general diagnosis of a tumour disease which presents such different clinical characters and which has rarely been diagnosed correctly before removal. The question of treatment is as difficult as that of diagnosis; for, while some sarcomas appear to be singularly malignant, there are others which are cured by a very simple operation. The sarcoma which Butlin removed is an example of the latter class: it was large and not encapsulated, although it was very well-defined. The half of the tongue in which it lay was removed, but that only included a thin layer of healthy-looking tissues on the median aspect of the tumour. It certainly appeared likely to recur, and it seemed a pity that the operation had not been larger, when we came to know the general and microscopical characters of the disease. But, several years after the operation, the man was quite well and free from any sign of recurrence.

In Butlin's and also in Bloodgood's case the submaxillary gland was enlarged owing to the compression of its duct by the tumour. The swelling of the gland subsided after the removal of the tumour.

Probably the wisest course in regard to treatment is to make a wide sweep in the removal of tumours which are suspected to be sarcomas; and, if there is recurrence of a growth which has been diagnosed as a sarcoma, to remove the recurrent disease by an operation which shall take away a considerable area of the surrounding apparently healthy tissues.

CHAPTER XVIII.

CARCINOMA OF THE TONGUE.

Incidence of Cancer of the Tongue with regard to: (a) All Cases of Cancer; (b) The Position of the Cancer on the Tongue; (c) Sex; (d) Age; (e) Rank in Life—Causation of Cancer: (a) Cause; (b) Predisposition and its Inheritance; (c) Exciting Causes—Smoking, Syphilis, Caustics—Development of Cancer—Pre-cancerous or Potentially Cancerous Conditions following: (a) Leukokeratosis or Leucoma, histological appearances; (b) Syphilitic Ulcers and Scars—Varieties of Cancer and Subjective Symptoms—Pathological Histology—Infection of the Lymphatic Glands—The later Course and Termination of Cancer—Dissemination—Diagnosis.

ONLY one variety of carcinoma attacks the tongue, viz. squamous - celled carcinoma or epithelioma. Glandular carcinoma has not been found, except in connection with the submaxillary salivary gland. There are great variations as to size of tumours, the extent of ulceration, the hardness or softness of the growth, the rapidity or the reverse with which the lymphatic glands are infected; but these are only variations of the same species of cancer.

1. Incidence of Cancer of the Tongue.

(a) *With regard to all Cases of Cancer.*—Among 4,600 cases of cancer collected from various papers by Jessett, those with cancer of the tongue numbered about 400, i.e. 8 to 8·5 per cent. It is well known that the death-rate from cancer exhibits a tendency to increase, and this includes cancer of the tongue.

Year 1897.—Sixtieth Annual Report of the Registrar-General of Births, Marriages, and Deaths in England.

London, 1899.

Population of England and Wales (estimated middle of 1897),
31,055,355. Males, 15,047,580; females, 16,007,775.

Total deaths from cancer, 24,443 ... Males, 9,573; females, 14,870
(·078 p.c., 78 in 100,000 of population) (39 p.c. of all cancers) (61 p.c.)

Tongue ... 550 ... Males, 477; females, 73
 (2 p.c. of all deaths (86 p.c. of all cancers)
 from cancer) of tongue, 5 p.c. of all
 male cancers)

Mouth ... 157 ... Males, 130; females, 27
 Pharynx and throat 301 ... Males, 221; females, 80

Names of Cancers of Tongue used.

	Cancer, Carcino- ma, Malignant Disease.	Scirrhus.	Epithelioma.	Sarcoma.
Males ...	267	2	207	1
Females ...	49	...	24	...
	—	—	—	—
	316	2	231	1

(b) With regard to the *position* of the cancer on the tongue, no part of the tongue is exempt from carcinoma, but the posterior half is not nearly so frequently affected as the anterior half, and the edges are more subject to it than the dorsum or the under surface. There is not any difference in the liability of the two sides to the disease. Nor is there the least reason to expect there would be any difference, for the conditions which lead to the formation of carcinoma are such as occur with equal frequency on both sides. The following table shows the relative frequency with which the different parts of the tongue were affected in eighty cases of carcinoma which Butlin collected:

Root ...	...	...	...	...	...	...	1
Anterior half and tip	...	...	...	...	...	...	3
Right border ...	...	...	...	...	...	...	12
Left border ...	...	...	...	...	...	...	17
Right side ...	...	...	...	...	...	...	11
Left side ...	...	...	...	...	...	...	16
Border... ...	...	...	...	...	...	...	1
Dorsum ...	...	...	...	...	...	...	15
Right underside ...	...	...	...	...	...	...	2
Left underside ...	...	...	...	...	...	...	1
Whole tongue ...	...	...	...	...	...	...	1
							—
	Total	...	...	...	...	...	80

Pre-cancerous conditions are much more common in the forepart of the tongue and at the borders than behind the circumvallate papillæ. Injuries and irritation, caused by the teeth or by tobacco smoke, affect more especially the anterior part of the tongue. The back part of the tongue is very vascular and rich in lymphoid and mucous

glands, but it is not so liable to injury and irritation except during the act of swallowing. Moreover, the absence of papillæ prevents fur from collecting, whilst various kinds of organism are always clinging to the filiform and fungiform papillæ even in the cleanest tongue; and, although the parasitic origin of cancer has not been demonstrated, yet it is interesting that the greatest liability of the tongue to cancer—in that part which lies in front of the **V**—should correspond with the presence of organisms which are almost absent on the base behind the **V**.

(c) *As regards Sex.*—Unless a large number of cases are taken, statistics are found to vary very much. There is an enormous preponderance of males, making cancer of the tongue one of the most important of the surgical cancers afflicting men, yet a not unimportant minority occur in women. Doubtless, in some series of cases, the number of women have been very few, only 2 or 3 per cent.; in others, on the other hand, they have reached 30 per cent. Among the 460 cases of cancer of the tongue collected by Jessett, 85 per cent. were males and 15 per cent. females. Whitehead's series of 104 cases contained 15 women. With them also agree Barker's series, 15 per cent.; Gurlt's, 14·6 per cent.; Landau's, 16 per cent. Other series are very different. Czerny's 26 cases, between 1878 and 1888, were all males. Among Kocher's 69 cases were only 3 women. Among Krönlein's 40 cases, 2 women. Wölfler gives 3·4 per cent. of females; Weber, 12·2 per cent. At the other extreme of variation is Sigel's list, 29·5 per cent. of women; Clarke's, 28 per cent.; Paget's, 36 per cent.; Brun's, 33 per cent.; and Hayn's, 43 per cent. We may conclude that if a large number of cases of carcinoma are added together, the number of females among them would not differ widely from 15 per cent. The reason for the difference in the liability of the sexes will probably appear in the paragraphs on the cause of the disease.

(d) *As regards Age.*—By far the largest number of cases of cancer occur between the ages of forty and sixty, they being fairly evenly distributed over that period. This means an increasing tendency to cancer between these ages, because the proportion of persons who survive beyond any given

year is constantly diminishing—a much smaller number of patients remain after sixty to be attacked. Moreover, the predisposing causes of cancer have already come into play; the influence of smoking and drinking, the results of syphilis, the injuries due to rough and carious teeth, have generally been felt by the tongue long before. The number of cases of cancer which appear after sixty, when the above-mentioned points are considered, forces one to conclude that the general tendency to cancer is as great after sixty as before.

Children and young adults are nearly exempt from cancer, which rarely begins before the age of thirty. This is partly to be explained by an absence of the predisposing causes; at least, these have not had sufficient time to develop cancer. But there are exceptions, and unfortunately very malignant cases have been met with; indeed, none seem to have been cured. Such exceptions may be due to the overwhelming force of some tendency, hereditary or otherwise. This accords with and partly explains that as many cases have been recorded in females as in males, also the virulent course of the disease. Taking those in males first, Variot notes an epithelioma of the tongue in a boy aged eleven, Chapple one in a man aged twenty-four. Two cases are known to Spencer; in both cancer had occurred in members of the family. A perfectly healthy and ruddy-faced man of twenty-four had a rapidly growing cancer, which was incompletely removed through the mouth, but the surgeon did not securely tie the arteries, and the patient died of recurrent haemorrhage. Another similar man, aged twenty-six, in whom there was no evidence at all of venereal disease, had an indurated, rapidly growing ulcer on the side of the tongue, the scrapings from which showed well-formed nest-cells. Antisyphilitic remedies had already failed, when at a consultation of the surgeons of the hospital the majority decided that the same measures should be continued, on the ground that the age of the patient negatived the idea of cancer. This was done, but a very rapid glandular enlargement set in, and the patient soon died.

Of the female cases, Harrison saw a girl, aged twenty,

who died in less than six months from the first symptoms. In this case there was no family history of cancer or evidence of syphilis.

The youngest patient Butlin has seen was a married woman, twenty-four years old, from whom he removed a very extensive squamous-celled carcinoma of the left side of the tongue, far back, where it grew into the tonsillar region. The glands would have been removed by a second operation, but they were hopelessly fixed and widely spread, so the operation was not proceeded with.

In Spencer's case, the patient's father had died of cancer of the throat (? larynx) eight years before, after suffering for two years. The influence of syphilis could be excluded with certainty. She was a ruddy-faced farmer's daughter, aged twenty-two, who had been acting as a schoolmistress in the country. Two months before an ulcer began opposite the left lower molar teeth. The ulcer rapidly extended ; it was not irritated in any way, and the adjacent teeth were removed. In two and a half months from the first sign of the ulcer an epithelioma had involved half of the tongue throughout its length, the floor of the mouth, the surface of the tonsil, and the adjacent portion of the soft palate. The whole of the disease was freely removed with all the glands in the digastric triangle, and healing took place. Some months later, an enlargement of the glands behind the sternomastoid, in the posterior triangle of the neck, occurred, and she died within ten months of the first commencement of the disease.

(e) *As regards Rank in Life.*—There does not appear to be any marked difference as regards liability among the various classes and occupations. To suck continuously an old clay pipe with a jagged stem is a habit of the lower classes, but in other classes there is a liability to slight burns from cigar and cigarette ends. Smoking among women, as a habit, is limited to certain groups, e.g., in this country, chiefly to Irishwomen and gipsies. Neglected syphilis, dram-drinking, and carious teeth might be thought more common among the lower classes ; as a set-off to this, the upper classes are more highly fed, consume more highly-spiced foods, wear ill-fitting tooth-plates.

2. Causation of Cancer.

(a) *Cause*.—Of the nature of cancer of the tongue, and of the general causes on which it depends, nothing more can be said than can be said on the nature and etiology of cancer generally: and that is very little. The manner in which the disease commences and the course it runs can be better explained on the parasitic theory of cancer than on most other theories; but there is yet no proof that cancer of the tongue is parasitic.

(b) *Predisposition*.—Of born or inherited predisposition there is singularly little evidence. And a family history of cancer in persons suffering from cancer of the tongue is rarely heard.

On the other hand, far more is known of the local conditions which tend to cancer of the tongue than of almost any other part of the body; and a great deal is known of the habits and circumstances which tend to the development of these local conditions. These conditions are practically summed up in long-continued irritative and inflammatory affections of the mucous membrane of the tongue, and in the white patches and thickenings which are left behind by such affections, and in ulcerations and in scarring. They have already been described in the chapters on chronic superficial glossitis, etc., and in the chapter on syphilitic affections of the tongue. Syphilis, gout, and rheumatism have been discussed as the predisposing causes of these conditions; while careless feeding, smoking, and drinking are regarded as the exciting causes of the commencement and maintenance of them.

(c) *Exciting Causes*.—The actual occurrence of cancer in these diseased tongues is ascribed to similar causes to those which are believed to lead to the development of cancer in tongues which are not thus predisposed to cancer; burns and scalds and scratchings produced by the passage of food, the irritation and damage produced by rough and carious teeth and by ill-fitting tooth-plates, smoking, especially frequent smoking, and the rubbing of the stem of a tobacco-pipe upon the surface of the tongue; and, perhaps, more often and more certainly than most of these, the application of caustics to ulcers and other affections of the tongue.

The question of the *influence of smoking* and of *syphilis* in the production of cancer of the tongue is often raised. With regard to smoking, we may speak more strongly than we ventured to do some years ago. We believe that smoking is a decided cause of the occurrence of cancer, not so much directly as indirectly; rather by producing or tending to produce those conditions of the surface of the tongue which predispose to cancer, than by immediately leading to the development of cancer in such tongues. We do not rely so much on statistics in support of this view as on our personal experience of individuals suffering from pre-cancerous conditions of the tongue and actual cancer. Thus, Whitehead only found sixty-one smokers among 104 persons suffering from cancer of the tongue, which seems almost a small proportion. But, the common history which we receive of much smoking, the great frequency with which cancer of the tongue is preceded by chronic inflammation of the surface of the tongue, which has occurred in smokers and been maintained by smoking, and the much greater liability of males to the disease than females, all lead us to this view.

Of *syphilis*, it may, we think, be said, that in so far as it is capable of producing ulcers and scars of the tongue, so far is it capable of predisposing the tongue to the occurrence of carcinoma. But the ulcers and scars produced by syphilis are not more prone to become cancerous than the ulcers and scars which are due to any other cause. Nor is the psoriasis (leucoma) or chronic superficial inflammation produced by syphilis more apt to become cancerous than a psoriasis or chronic superficial glossitis which has had no connection with syphilis.

But the influence of syphilis is not limited to the power it possesses of producing superficial inflammation of the tongue. It is prone to leave scars along the borders of the tongue, and these, when they are irritated, may at a later period become cancerous ulcers. Even the fissures and scars left by the breaking of deep-seated gummata may afterwards become the seat of carcinoma. Such cases are probably very rare, but an excellent proof of the

possibility of their occurrence was presented to the London Pathological Society by the late Mr. Morrant Baker.

A man, aged forty-seven, contracted syphilis about twenty years before the appearance of the cancer, and about two years later began to suffer from ulceration of the tongue. He frequently attended Baker, at St. Bartholomew's Hospital, thirteen years before, for gumma of the tongue, and about ten years before a water-colour drawing was made of his tongue as a typical case of ulcerating and sloughing gumma. Until a few months before, the disease had always yielded to the administration of iodide of potassium; but it then ceased to take effect. At the date of the record the epithelioma, which had commenced in the scar, had spread beyond the tongue to the adjacent structures and lymphatic glands.

Of the *application of caustics*, we must repeat what was said in the first edition of this book—*If there be one thing more harmful than another in the treatment of simple indolent sores and affections of the tongue in persons over thirty years of age, it is the application of a strong caustic.* Yet the practice of applying it still finds favour in the eyes of a large number of practitioners, and unfortunately secures the approval of their patients, who feel that something is being done for them, and who place great faith in caustics. The practice is one which cannot be too strongly protested against. The result of strong solutions or of solid nitrate of silver on some of the indolent sores remaining on the tongues of children after aphthous ulceration is admirable; and the same remedy may be employed with good effect in the treatment of some of the indolent sores and fissures resulting from tertiary syphilis in comparatively young persons. But the use of caustics should be absolutely avoided in the treatment of sores of whatever kind on the tongues of people after thirty years of age. Caustics are not necessary, and the good which they may do is as nothing compared to the cruel harm which they have done to many tongues. So far as affections of the tongue are concerned, we should not be sorry if caustics were never again employed in the treatment of any of them.

3. Development of Carcinoma.

The *first appearance* of a carcinoma may vary within very wide limits. It may commence as a blister, as an excoriation, an ulcer, a fissure, a pimple or tiny tubercle, a wart or warty growth, or a lump or nodule in the substance of the tongue. The great variety of aspects in which the disease may possibly present itself depends not on the tendency of cancer, like syphilis, to assume very various appearances in the same part of the body, or to imitate other diseases, but on the fact that all these different conditions are capable of being, so to speak, inoculated with carcinoma. There is ample evidence to prove that many of the forms of disease in which cancer first appears are in the first instance, and even for a long time after their first appearance, simple non-cancerous affections. The excoriation, or ulcer, due to a burn or bite, for example, is certainly not in the first instance cancerous. And the sores which are due to the rubbing and scraping of carious teeth are as certainly not cancerous at the onset. The warty growths, too, in which carcinoma not uncommonly develops on the dorsum of the tongue are at first innocent.

A blister usually breaks and leaves an excoriation or an ulcer, and a pimple does the same thing, so that for all practical purposes, blisters, pimples, excoriations, ulcers, and fissures may be considered in the same category. Indeed, were it not for the history given by the patient, the first commencement in a blister or a pimple would scarcely be admitted by a medical man, so rarely does he see this very early stage. The sore place, no matter what is its origin, is at first generally indolent, or having been more or less acute, becomes indolent, and bears all the signs of a chronic sore, discharging little, paining not much, changing little or not at all. If, as is not unusual, it is seated on the border of the tongue, it often stands out on a slightly raised base, or, if it is a fissure, makes its place known by a slight prominence of that part of the border. Either from ignorance on the patient's part, or from ill-advised treatment, it is irritated, and then slowly enlarges. The surface of the open sore becomes uneven, the fissure becomes deeper and ragged; the surrounding area may

become inflamed, but more often is only a little angry. But, and this is one of the most important features in the change, the surrounding area and the base become slowly and almost imperceptibly harder, or being from the first indurated, become more and more hard. It is probable that at this time the lesion has already become carcinomatous, for the disease now presents some important characters of carcinoma, of which induration is certainly one of the most important; and from this time it may rapidly increase, and may unfold one by one such signs of carcinoma as cannot be mistaken. But there is no particular moment, at least clinically, at which it can be said that the change from a simple lesion to a carcinoma has taken place. Occasionally, even at this stage of the disease, the changes in the sore are accompanied by enlargement of one of the glands beneath the jaw; but, although this renders the prognosis of the sore more grave, it does not necessarily mean that the gland is cancerous.

Of all the actual beginnings of cancer there is none nearly so important as a wart or warty growth (Fig. 25), especially when this forms on the surface of a tongue which is the seat of one of the chronic conditions which predispose to the occurrence of cancer. Not only is it the most frequent by far of all the conditions which pass directly into cancer, but it is probable that it never occurs on the surface of such tongues without becoming cancerous if it is not removed or completely destroyed. It may therefore be described not only as a predisposing cause of cancer, but as an actual *pre-cancerous condition*. In the first edition of this work the various conditions which may pass directly into cancer were described as if they were of equal value; but now we believe there is no doubt that warts and warty growths occupy the first place by a long distance, and that ulcers, and the various conditions leading to the formation of ulcers, and lumps or nodules in the substance of the tongue are of quite minor importance. Several of these warty growths are figured in the plates, and we could give an account of many of them, and of the manner in which they appear to pass into cancer. But two will serve as well as many examples. Years ago two of these

cases were under care in the hospital, one of a simple warty growth on the dorsum near the middle line, the other of a larger warty growth in a corresponding situation which had actually become cancerous. Both tongues were the seat of leucoma of many years' standing, but so little troublesome that it had scarce been noticed. Owing prob-



Fig. 25.—WARTY EPITHELIOMA.

Photographed from a section of a Warty Epithelioma removed by Spencer.

The thickened Epithelium is seen to pass over into irregular masses of Epithelial Cells. Compare with Fig. 24, p. 295, of a Papilloma which doubtless would have soon developed into this condition.

ably to some greater irritation than usual, a warty growth had formed in the midst of the diseased area. In the first case the growth measured about five-eighths of an inch in its long diameter (which was parallel with the long diameter of the tongue) by one-third of an inch (Plate V., Fig. 3). It stood forth from the surface of the tongue like a small bean, with a slightly papillary or warty contour; it was firm, but elastic, painless, and without induration around its base. There was no ulceration or even excoriation of the surface, although, from its situation, it must have been exposed to frequent injury and irritation. In the second case the growth measured nearly an inch by

more than half an inch, and its long diameter was, as in the other case, parallel with that of the tongue. It had probably been, not a very long while previously, exactly like the smaller growth, but had become ulcerated, was firmer, and its base was indurated for a short distance in the substance of the tongue (Plate VIII., Fig. 1). Naturally the smaller growth was not watched until it developed into a carcinoma ; but, had it been, it would have slowly been transformed into such a growth as was the second. In all cases of the transformation of warty into cancerous growths, the increase of size, the ulceration, greater firmness of the tumour itself, and the growing induration of its base, are the principal characters by which the change is announced. (Cf. Fig. 25 with Fig. 24, p. 295.)

The least frequent commencement of carcinoma of the tongue is that in which it begins as a lump or nodule in the substance of the organ, or, to speak more correctly, in the tissues beneath the surface; for although the lump often appears to be situated deeply in the substance of the tongue, and only projects slightly on the surface, there are good reasons for believing that it has originated in changes in the deeper layers of the cuticle. Such a lump or nodule is probably, in many cases, if not in all, carcinomatous from the commencement, and does not become, like the ulcers and warts, inoculated or impregnated with carcinoma. It may, indeed, be said to correspond with the thickening and induration around the base of the ulcer or wart, which has been pointed out as a very significant and reliable sign of the transformation of a simple affection into a carcinoma. And it is due to the same condition, the ingrowing of cylinders of epithelium from the cuticle into the subjacent tissues. But, whatever may be the actual pathology of the lump, the manner of its growth and the characters which it develops are in almost every case the same. It slowly enlarges in the substance of the tongue, is very firm, then projects rather more upon the surface, and finally breaks. When the breaking is accomplished, there is not necessarily a discharge, and the formation of a deep and foul excavated ulcer, although this may occur; but a fungous mass may protrude, or the edges of the

sore may enlarge, become nodular or tuberose, and everted.

The leucomatous patches or placques show clinically the change into cancer by commencing to ulcerate. When ulceration becomes evident the pre-cancerous condition has already passed into the cancerous. Before actually ulcerating, a patch which has remained unaltered for years becomes a little more red, a little thicker, its smooth surface is interrupted by pimples or nodules, and a little more discomfort or soreness is experienced.

The frequency with which *ulceration* occurs, and the early stage at which it commences, may be imagined from what has been said. Ulceration is indeed so frequent that it may be regarded almost as a necessary condition of lingual carcinoma. Probably, the only cases in which ulceration is absent for some long time after the disease is thoroughly developed, are those in which it commences in a warty growth. When this is very papillary and rather dry and hard, it may remain long unbroken, and the carcinoma may develop in the substance of the tongue. The lump or nodule underneath the surface is also not ulcerated at first, and may develop to a considerable size before it breaks down, but it seldom remains unbroken for more than a few weeks. And it has been pointed out in the preceding paragraphs that this is the least common form of development of lingual carcinoma. In the diagnosis of the disease, the frequency and great importance of ulceration will be again adverted to.

4. Varieties of Cancer.

The *objective characters* of the fully-developed disease are very striking, as a rule very unmistakable, and yet widely different in different cases. We have before us four coloured sketches of lingual carcinoma, made by Mr. Godart from cases in St. Bartholomew's Hospital. One of them is of the carcinoma which developed from a warty growth; it has already been described and needs no further mention. (Plate VIII., Fig. 1.) The second was taken from a case under the care of Sir Thomas Smith. On the left border of the tongue is a large prominent mass composed of several red raw tubers growing from a constricted base, and in a

central depression is a dark greenish grey slough (Plate VIII., Fig. 2). The impression of the whole is of the unfolding of some hideous flower, with its red and fleshy petals turned back, and a horrible mass of corruption hiding its pistil and stamens. Nor is the impression falsified by the foul odour which proceeds from the loathsome weed. For the third we are also indebted to Sir Thomas Smith. The tongue lies at the bottom of the mouth and cannot be protruded, but through the open mouth the whole of the left half of the organ is seen transformed into a raised, warty, and granular mass of irregular form, covered here and there with sloughs or clotted pus, and broken by deep irregular fissures, furrowing it up in various directions (Plate VIII., Fig. 3). In front the disease is limited by the middle line, but not far from the tip it bulges over on to the right half of the tongue. In the last case the dorsum, except where it was actually invaded by the disease, was natural and thickly furred; but in this case the remainder of the dorsum is perfectly smooth and equally void of fur and of papillæ. The fourth patient was under Butlin's care, who removed his tongue for what is represented in the picture as a disease chiefly of the left border. It is an oval ulcer without any granulations, but with a smooth glazed surface, which dips in at the centre to form a long and narrow chink. It looks as if the centre were drawn in by some force placed deep beneath the floor of the ulcer. The whole sore is set upon a raised base, over the sides of which the mucous membrane passes to the margin of the ulcer, where it is abruptly limited (Plate VII., Fig. 3). Along the border in front of the disease is a linear superficial ulcer, with irregular notched edges, a simple, indolent ulcer; and the whole of the dorsum is smooth and pearly or opaque white, without fur, and set here and there with raised warty growths, any one of which might by-and-by become cancerous. Other cases, widely differing from these, yet equally typical of carcinoma, are seen from time to time. For instance, that of a man whose tongue was scarcely more than excoriated at any part, nor was it enlarged. Indeed, it appeared to be smaller than natural, as if shrunken by the disease like a scirrhouss breast. It was

smooth and glazed and irregularly furrowed, and almost the whole of the front part was transformed into a hard inelastic substance, almost as hard as wood and almost as unyielding.* So, too, about the same time there was a patient in the hospital, under the care of Mr. Willett, with a very warty epithelioma of the dorsum of his tongue. The surface was dry and hard, and was at no part ulcerated. The disease might well have been a simple papillary growth had it not been for its indurated base extending into the muscular substance. This patient suffered from typical ichthyosis of the tongue, and the inside of the lips and cheeks, for the surface of all the affected parts was not merely thickened and harder than natural, but decidedly papillary. Another not uncommon form of carcinoma is that in which a deep and foul ulcer is excavated in the substance of the organ. Its edges are usually raised and everted, and nodular or tuberose; the interior is occupied by slough and discharge and decomposing food; and the surrounding tissues are infiltrated and indurated.

The foregoing instances may be regarded as typical varieties of cancer. There are others which are met with, although less often or only rarely.

Double Epithelioma.—Two distinct epitheliomas may develop simultaneously upon the same tongue, having between them at first healthy epithelium. A good number of cases are recorded, but the number two has not been exceeded. A simultaneous malignant change goes on in two patches or scars.

Diffuse Epithelioma.—A patient, the dorsum of whose tongue has been long affected by chronic superficial glossitis due to syphilis and tobacco, instead of having an ulcer at one part, which deepens as it extends, may exhibit a widespread excoriation or very superficial ulceration, accompanied by very slight symptoms. The epitheliomatous change begins simultaneously over the whole of the dorsum of the anterior half of the tongue, and yet has not at the moment extended deeply, although, if not operated upon, the tongue will be

* The name of atrophic or fibrous epithelioma is sometimes given to this variety. It deserves more careful study than it has yet received, particularly in reference to its origin in syphilis. (See Fig. 30, p. 329, also the references.)

covered all over by a malignant ulcer. A microscopic section taken from any part of the dorsum will exhibit down-growing epitheliomatous columns.

Hypertrophic Cancer.—Occasionally the tumour projects from the mouth, dragging out the tongue by its weight, and adding to the difficulty which the patient has to take food. It may follow upon syphilitic hypertrophy. It does not present any differences as regards virulence.

Epithelioma of the Floor of the Mouth.—This form of cancer is liable to be overlooked, as it commences in a fold of the mucous membrane covered in by the tongue. The attention of the patient may not be called to it until it has already spread deeply into the tongue. All that can be seen at first sight is a little nodule, perhaps ; only when the tongue is raised, and the edges of the fold separated, does the disease come into view. It is then found that the disease has spread in depth rather than on the surface, a probe passing deeply into a cavity enclosed by indurated walls. Even the most thorough clinical examination may fail to disclose the whole extent, which can only be guessed at from the increasing pain, salivation, and fixation. If the tongue is dissected after a wide removal, the extent of the disease will generally be found much greater than the clinical examination would have led one to expect.

Symptoms.—In the earlier stages of carcinoma the most distressing *subjective symptoms* are usually pain and salivation. The former may be present from the first, may be very sharp or aching or gnawing, and may radiate into the surrounding structures as far as the ear of the same side. Aching pain in the ear is a frequent effect of carcinomas situated far back on the border or side of the tongue. Salivation is not usually distressing until the disease is more advanced, but in the later stages often greatly aggravates the sufferings of the patient. Neither of these symptoms can be regarded as in any way essential to the presence of a carcinoma; nor, on the other hand, are they proper only to carcinoma; they are even more common in connection with tuberculous ulcers, and are usually produced by these much earlier than by carcinoma. It is surprising how very painless and free from salivation

some carcinomatous ulcers are, even when they are so situated that they are constantly irritated or injured. It is, however, very unusual for a carcinoma to run its course without producing both pain and salivation in its later stages.

5. Pathological Histology.

It has been already stated that the only form of carcinoma which has been found as a primary disease of the tongue is squamous-celled carcinoma or epithelioma develop-



Fig. 26.—COLUMNS OF EPITHELIAL CELLS GROWING DOWNWARDS AND ANASTOMOSING.

Reproduced from Butlin's "Sarcoma and Carcinoma," 1882. Plate III., Fig. 6, pp. 130-131.

A section of a tongue in which Epithelioma followed Chronic Superficial Glossitis. (Compare Fig. 9, p. 142.) Columns of Epithelial Cells are growing downwards into the subepithelial tissues and are commencing to anastomose with one another. $\times 8$.

ing from the stratified epithelium of the surface. Glandular carcinoma has occurred in the submaxillary gland, but from the mucous glands on the surface of the tongue no instance seems to have been seen. The minute structure of the disease resembles the minute structure of epithelioma in other similar parts of the body. Columns of epithelial cells (Fig. 26), resembling those of the deeper layers of the epidermis of the tongue, and directly continuous with them, grow down into the fibrous tissue, and through the fibrous tissue into the muscles. Some of the columns grow perpendicularly downwards for a considerable distance, although they seldom maintain the same thickness and uniformity throughout; but, as a rule, they diverge, branch, anastomose with one another, and form networks in the deeper structures of the tongue. The columns, or processes, which form these networks are for the most part slender, distinctly composed of altered epithelial cells, and enclosed as it were with a single layer of the same kind of cell placed vertically

to the tissues (Fig. 27) which surround the column, like the deepest layer of the epidermis, but not nearly so regular or even. The cells of which the columns and various processes of the growing tumour are composed are easily recognised as epithelial, yet they differ in many important respects from the cells which form the normal epidermis of the tongue. They vary considerably in size, and are generally smaller than the cells of the more superficial layers of the epidermis. They vary as much in shape, but are seldom distinctly spindle or caudate. Many of them are frayed out at the borders (Riff-zellen). Most of them are furnished with nuclei, which are very large in proportion to the size of the cells, and many of them contain two or more nuclei, nucleolated, or are mother cells, filled with two or more secondary cells. These

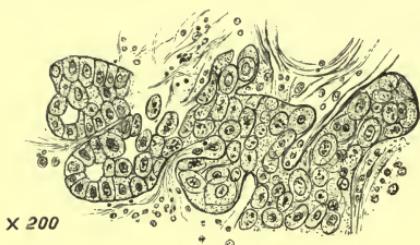


Fig. 27.—GROWING PORTIONS OF EPITHELIAL COLUMNS.

From the same source as the preceding—Plate III., Fig. 4.

From the deeper parts of an Epithelioma of the Tongue showing arrangement of columns of cells. $\times 200$.

appearances, the regular and irregular division of the nuclei, the vacuoles, the granules, have attracted much attention, and different interpretations have been put upon them (p. 116). The larger columns frequently contain cell-nests or epidermic globes (Fig. 28); rounded bodies consisting of one, two, or more altered central cells surrounded by layers of flattened scale-like cells arranged like the scales of a tulip or crocus bulb. Smaller cell-nests may also be seen in the more slender columns, which they sometimes cause to bulge unequally. The columns, or processes, of epithelium are not enclosed in any visible membrane, yet they are almost always clearly separated from the surrounding fibrous or muscular tissues, which are infiltrated with such small round cells as are invariably found in the tissues bordering on a malignant tumour.

With regard to nest-cells, small ones may here and there be seen among the stratified layers of normal epithelium. It

may, however, be mentioned in relation to this circumstance that the microscopic test in diagnosis is not likely to be rendered useless or deceptive by the discovery of cell-nests in scrapings of simple ulcers or of the healthy portions of the tongue; for in the scrapings of more than a hundred tongues, healthy and diseased in various ways, but not carcinomatous, we never have seen anything which resembled a cell-nest. The epithelial cells, too, which are scraped in large numbers from the surface of an epithelioma, are so widely different from the small round cells scraped from other ulcers and from healthy tongues, that there is no reasonable fear that a single cell-nest, even if it should be found, would lead to the belief that the sore from which it came was carcinomatous. It is not necessary that a nest-cell should be seen in any particular section, although, if several sections from various parts of the growth be examined, some instances are met with. In the soft, vascular, rapidly growing "medullary cancer" masses and columns of cells running along between the muscular fibres are seen with no, or only imperfectly-formed, nest-cells (Fig. 29). A scraping from the surface of such a growth will then only exhibit epithelial cells. The opposite "scirrrous" type above referred to is shown in Fig. 30.

It is the small-celled infiltration, especially when this invades the epithelial cell-masses, causing degeneration or even suppuration, that makes it difficult to recognise epithelioma unless well-formed nest-cells are seen (Fig. 31). If only one section

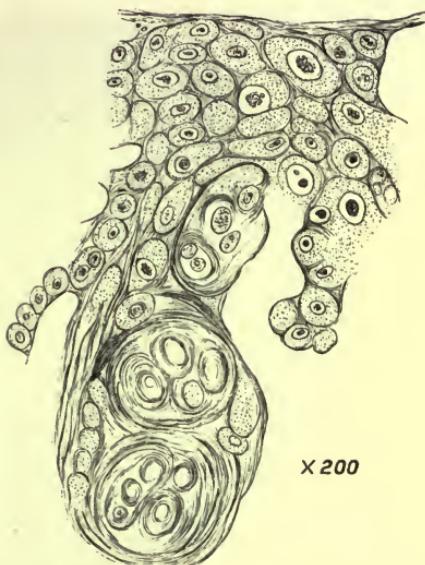


Fig. 28.—EPITHELIOMATOUS NEST-CELLS.

From the same source as the preceding—Plate III.,
Fig. 3.

Epithelioma of the Tongue, showing characters of Cells and Cell-Nests. $\times 200$.

is examined where the epithelial cells are overrun and obscured by the small round cells, malignant disease may be mistaken for innocent ulceration. If the case is clinically suspicious, the negative result of the examination of one section should lead to the investigation of fresh sections from other parts.



Fig. 29.—RAPIDLY GROWING EPITHELIOMA WITHOUT NEST-CELLS. “MEDULLARY CANCER.”

Photographed from a section of the very malignant case in a young female, under Spencer, mentioned on p. 313.

Masses and columns of cells are infiltrating the muscular fibres without forming Nest-Cells.

The epithelial cells from an epithelioma could only be mistaken for those in a tubercle. Generally, the nest-cell in the one case and giant cell and central caseation along with the bacilli in the other, are the characteristic features. The cells of a cancer are polygonal epithelium, showing division of nuclei, vacuolation and granules, as distinguished from the flattened epithelial or endothelial cells of tubercle. When, however, the small round cells obscure the main features, and suppuration and caseation occur, more careful examination of several sections is required to distinguish between the two.

6. **The course** pursued by an untreated carcinoma depends

largely on its situation on the tongue. If it commences on the dorsum it extends into the muscular substance, and probably infiltrates a large part of the tongue before it reaches the adjacent structures, or it may never reach them. If it is situated on the border, especially just beneath the



Fig. 30.—HARD SCIRRHOUS EPITHELIOMA.

Photographed from a section of a slowly growing form of Epithelioma removed by Spencer, but in which the scarcely enlarged glands were already infiltrated.

The columns of Epithelial Cells not showing distinctly formed Nest-Cells are embedded in a mass of newly formed fibrous tissue which has replaced the muscular fibres.

border, it infiltrates the tongue, and at the same time makes its way along the floor of the mouth to the gum and jaw. The tongue becomes fixed, and can no longer be protruded or even move much in the interior of the mouth. The bone itself is invaded, grows softer and carious and crumbling, and by-and-by the teeth become loosened and drop out. When the disease commences farther back, it spreads into the root of the tongue, gradually makes its way to the epiglottis, and through it to the larynx; or, and this is perhaps more usual, it grows into the half-arches of the palate and the tonsil, and may even spread up on to the palate itself, or, burrowing

deeply, open the tonsillar artery, or the internal carotid, and so prove fatal. Whatever be the course of the disease within the mouth, if it is left untreated *the glands* will certainly be diseased.

7. Infection of the Lymphatic Glands.—Epithelioma of

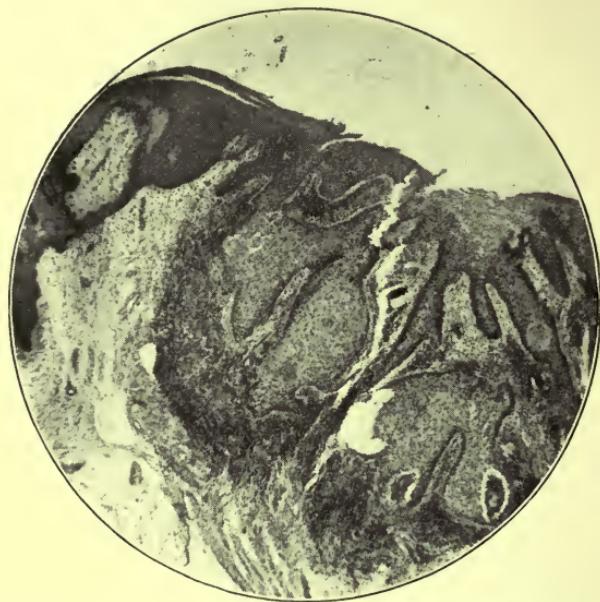


Fig. 31.—EPITHELIOMA WITH SMALL CELL INFILTRATION.

Photographed from a section of Epithelioma developing in the case referred to under Fig. 8, p. 117, q.v.

The columns of epithelial cells with nest-cells are in places much obscured by small round cells.

the tongue, when not removed, inevitably extends to the lymphatic glands, and this at an earlier period, and to a degree and more widely than is generally obvious to clinical examination. This unwelcome truth has come to be recognised by observation of the course of the disease where no operation has been performed, of the great frequency and the early development of glandular enlargement where the whole of the disease in the mouth has been successfully removed, and by careful microscopical examination of glands removed in the course of submaxillary operations. It was a view prevalent among surgeons until recently that a tender-

ness or soft enlargement of the glands below the jaw and in the neck might be presumed to be due to inflammation, and there was a tendency not to admit a gland to be infiltrated by cancer unless it possessed a considerable degree of induration. In a doubtful case, it was argued that the glands were unusually well felt owing to recent loss of flesh and thinness of the patient, or because they were pushed towards the surface by the new growth in the mouth.

It is now generally admitted that a simple inflammatory enlargement, such as will with certainty subside after removal of the primary growth, is a rare matter. It most definitely takes place in the case of the submaxillary salivary gland when the duct is blocked by pressure of the new growth. Two instances of the kind, Butlin's case and Bloodgood's, are mentioned in the chapter on sarcoma. It may be possible to make out this by palpation, together with the obstruction to the passage of a probe down the duct. But the propriety of removing the primary growth only in a case of epithelioma is contradicted by the fact that an epithelioma, in order to obstruct the submaxillary duct, must have commenced or have spread to the floor of the mouth, and is therefore the most likely of all cancers of the tongue to infect the lymphatic glands early and widely.

It is of course true that foul ulceration and decomposition going on in the mouth cause an inflammatory enlargement, or even suppuration, and if the disease is removed from the mouth and healing follows, the glands may subside. Even after an abscess has formed, temporary relief, with subsidence of the swelling, will follow. If, however, an epithelioma has advanced far enough in the mouth to be the cause of inflammation of the glands of the neck, the tendency of all recent observation is to show that the epithelioma has already reached the glands, and the malignant growth will continue, although inflammation has subsided. The view as regards the frequency of inflammatory enlargement was doubtless favoured by imperfections in diagnosis, inflammatory conditions being more often called cancer than is the case at present; also, surgeons were content to record the successful results of operations without following up and publishing the fate of the patient.

In Chapter I. a brief anatomical description has been given of the lymphatic glands in the neck. They were fully described by Sappey, but surgeons have only recently come to make special use of his anatomical work. An indirect means of bringing this about has been the improvement



Fig. 32.—EARLIEST STAGE OF EPITHELIOMATOUS INFECTION OF LYMPHATIC GLANDS.
Photographed from a section of a submaxillary lymphatic gland which, when removed, did not appear enlarged. (Spencer.)

If such glands as those slightly swollen, yet not perceptibly so on palpation through the skin, be carefully examined in well-prepared microscopical sections, concentric groups of epithelial cells will be found in the lymph spaces, which are rapidly proliferating and tending to form nest-cells, whilst immediately around the lymph corpuscles are increased in number, but the rest of the gland normal.

in the surgery of the breast which has followed from an increased knowledge of the lymphatics and lymphatic glands infected by mammary carcinoma. Yet these successes are only suggestive of what may be accomplished in the case of the tongue, for there is no strict analogy between the two—the one concerns a glandular cancer and the other an epithelial one. The epithelial carcinoma apparently does not lodge in the lymphatic vessels, but the cells are thought to pass, like emboli, to the lymphatic glands, an important factor to which Heidenhain has drawn attention. At first sight the anatomical account of the lymphatics and glands connected with the tongue does not seem to aid surgery,

when one learns that an injection into almost any part of the muscular substance of the tongue or underneath the mucosa of the floor of the mouth is followed by the spread of the injection to the glands in all directions. Indeed, a contemplation of his anatomical observations, in which he confirms those of Sappey, has led Küttner to propose as the regular operation a reflection of the skin on each side of the front of the neck and the removal of all the lymphatic glands from the area bounded by the jaw and mastoid process above, the sternomastoid behind, and the sternum and clavicle below. Whilst such a dissection may be surgically possible and even reasonable in a few patients, it cannot be generally applied ; indeed, it is out of the question in many cases.

Whilst it is now well known that removal by the mouth, together with excision of glands which are felt to be enlarged, is very often insufficient, yet the difficulty is to say how far the dissection of glands not obviously enlarged should be carried. This is a question which further clinical observation can alone decide. Roughly speaking, cancers of the tip of the tongue infect the submental glands (Fig. 7), those of the middle of the tongue and floor of the mouth, the submental, submaxillary, and carotid glands, those of the base of the tongue, the upper and lower deep cervical glands (the parotid and carotid groups). But experience shows that this generalisation is very imperfect from a surgical point of view. It is the chain of the deep cervical glands, which lie generally in front of the internal jugular vein, and overlapped by the anterior edge of the sternomastoid, to which attention must be directed ; especially the lower glands of this chain, which are placed over the bifurcation of the carotid, at the level of the thyroid cartilage (the carotid group). These deep cervical glands extend upwards to the base of the skull, and downwards below the crossing of the omohyoïd muscle. It is not a question of one "carotid gland" which becomes infected, but of a chain. But, although the entire chain may be infected, the glands at the bifurcation of the carotid are often the first and the most infected, as one of the large efferent vessels runs directly down to them.

Malignant infiltration of the sublingual salivary gland is the result of direct extension. The submaxillary salivary gland may be infected in the same manner, but infection commonly spreads into it from lymphatic glands which lie within its capsule, before any direct extension to it has taken place.

Goldmann believes the veins may be a source of infection. The lymphatics, after passing through the deep cervical glands, enter the jugular veins. But he believes also that the veins leaving the tongue and floor of the mouth may be channels of infection to the submaxillary and parotid salivary glands. We do not know on what evidence this opinion rests. As a rule, early infection of lymphatic glands is unilateral, when the primary growth is itself strictly unilateral and limited. A bilateral infection is, as a rule, observed only when the growth extends beyond the middle line, although the glands on one side may be in a more advanced stage of disease than those of the other. But the unilateral character of the infection does not hold for the later stages. The glands on the opposite side often become infected and enlarged before the case terminates. Again, a growth which approaches the middle line may infect the glands on the opposite side even to a greater extent than on the same side. Even worse, a small and limited epithelioma, far back on one border of the tongue, is occasionally associated with affection of the glands on both sides of the neck, or on the opposite side alone. If, however, the rule as regards unilateral infection be strictly limited to the early stages, and only to those growths which do not approach the middle line either on the surface or insidiously in the deep substance, then the exceptions will be found to be very few.

The appearance of a lymphatic gland markedly infected with epithelioma does not differ from that of the primary growth. On cutting across the enlarged gland the section shows whitish nodules or masses, which may be soft and breaking down in the centre, or of various degrees of hardness, even so fibrous as to creak under the knife. Sections examined microscopically show masses of epithelial cells with the peculiarities above described; also often, but not invariably,

nest-cells, one or more in a section. In some cases the glands become actually cystic and fluctuate. They are full of clear or turbid fluid, but the wall of the cavity is cancerous.

It is otherwise with glands in the earliest stage of the infection. Then they may be so soft and small as not to be felt until the fibrous tissue covering them has been divided. They appear only slightly enlarged, or, if markedly so, still soft and vascular; but the simple or smallest compound glands appear more numerous than in an ordinary dissection, because they are rendered prominent by the commencing infection. On cutting a somewhat swollen gland across, one or more minute white points may be seen, or several small haemorrhages, which, when the gland has not been roughly handled in removing it, are suspicious signs. The careful examination of a number of microscopical sections from several such glands will show many spots where a new growth of epithelioma is beginning and nest-cells forming, embedded in the lymphadenoid tissue of the gland (Fig. 32). Of course, the examination of any one section from a gland may be negative, and it is only from a number of sections from many glands that a correct idea of the extent of glandular infection at the time of the operation can be estimated.

8. The later Course and Termination of Cancer.

In every case which we have seen or read of in which no operation was performed, the glands were affected. The disease is not really limited to the parts which are first and most markedly affected, but has spread, perhaps very deep down, through the adjacent parts without altering them to such a degree that the alteration can be discerned by sight or superficial touch. The affected glands are at first small and hard, and freely movable, but as they increase in size grow softer and are less movable, until at length they may distinctly fluctuate, and are quite immovable. Sometimes they form an enormous mass on one or both sides of the neck. The mass may partly suppurate, and gradually form a deep chasm lined by foul granulations and gangrenous pieces of new growth, or, still more strange, after remaining for a while open and discharging,

heal up and shrink to a fibrous mass, but never entirely subside.

It would be a great advantage if it could be shown that the glands are never affected during a certain definite period after the first appearance of the disease within the mouth; if, for example, it could be laid down as a law of carcinoma of the tongue that affection of the glands never occurs within six months after its first appearance. Unfortunately, this cannot be done. In some reported cases the glands are said to have been enlarged at the time the disease was first noticed in the mouth, and although it is in the highest degree improbable that carcinoma was developed in the tongue and the lymphatic glands simultaneously, there can be no doubt that affection of the glands does sometimes occur extremely early—so early, indeed, that the disease is only recognised as carcinomatous by the enlargement of the glands which is associated with it. It is probable that in the most rapidly progressive cases the glands may be affected within a few weeks after the disease in the mouth has become actually carcinomatous. On the other hand, there is quite as good reason to believe that carcinoma of the tongue may exist for six, or possibly even more months before the glands are involved.

As the disease advances, speech and swallowing become more and more embarrassed. When the tongue is bound down to the floor of the mouth, and there is profuse salivation, it is extremely difficult to understand what the patient says. The acts of swallowing after the food has made its way to the back of the mouth are usually accomplished without difficulty, but the collection of the food from the sides of the mouth and the massing of it into a bolus are impossible, on account of the immobility of the tongue. Fluids and such soft and coherent solids as jellies are, therefore, more easily disposed of than solids which are masticated. The later stages of the disease are not infrequently complicated by haemorrhage from vessels opened by the progress of the ulceration; the haemorrhage may be arterial or venous, and even capillary bleedings may be frequent and troublesome. But death from haemorrhage, in cases which are not treated by operation, is not by any means the most

frequent termination. The large majority of patients die through slow exhaustion, increased in some cases, no doubt, by repeated small bleedings. The exhaustion is due to several causes; to pain, to profuse salivation, inability to take sufficient food, sleeplessness, suppuration, and, in some instances, sloughing of the cancer. And when the patient is in a state of extreme exhaustion, the final blow is sometimes administered by a low form of pneumonia, which is much more commonly observed in those who die after removal of the disease. It is to be lamented that haemorrhage is not a more frequent cause of death than is actually found to be the case, for the sufferings of those who die of cancer of the tongue, whether without operation or with recurrence after operation, are in most instances severe.

Patients who are not operated on usually die within a year or eighteen months after the first appearance of the disease; or, if an ulcer has existed for years upon the tongue and has become cancerous, within a year or eighteen months from the time at which the alteration in its characters was observed. The shortest duration of life of which we have any record was in an old and feeble woman of seventy-eight years, who died five months after the first appearance of disease within her mouth. The large majority of the unoperated die within twelve months.

9. Dissemination.

This in connection with carcinoma of the tongue is a somewhat rare event. Whether it be that patients die too early for the occurrence of dissemination (a very improbable suggestion, when the rapidity of the dissemination of some sarcomas of bone and of some carcinomas of the breast is remembered), or whether the channels through which dissemination can occur are not easily available (a suggestion not more acceptable than the first, when the situation of the disease and the great vascularity of the tongue are considered), or whether squamous-celled carcinoma originating in the tongue has very little tendency to strike root and grow in any other organs than the tongue and glands, or whether the cells travelling like emboli along the lymphatics are nearly always caught in the meshes of some lymphatic gland and do not reach the veins, the fact remains

that dissemination of the disease rarely takes place. Yet it is possible that it may occur more frequently than is now supposed, for the number of post-mortem examinations of persons who have died from the disease, either unoperated or after recurrence, is small, so that very large conclusions must not yet be drawn upon the subject. It might be thought that the lungs would be more frequently affected than any other organ, on account of the relation which they bear to the part primarily affected. Material may be carried into them by the inspired air or through the medium of the blood. But experience, that is, the experience which we possess at present, shows that the liver is affected as frequently as the lungs, in some cases with the lungs, in some cases alone. If this rule proves, after more extended investigations, to be correct, it can only be supposed that the tissue of the liver affords a more suitable soil for the planting and development of the disease than the tissue of the lungs.

Féré met with three nodules of epithelioma, the size of large peas, in the wall of the right and left ventricle of the heart. The man was aged sixty-four, was a great smoker, and suffered from ulceration of the tongue for some months, and there was enlargement of the submaxillary and sternomastoid glands. The tongue was removed, and a growth immediately recurred on the stump. There was extension in the neck, and death followed four months after the operation.

A woman aged fifty-five, under Hutchinson, was found to have epithelial cancer in the lungs and bronchial glands. In Godlee's case the development of secondary growths was most unusually extensive. The primary growth was a small hollow epitheliomatous ulcer on the left side of the under surface of the tongue. There were minute nodules of growth in the skin covering the left half of the thorax and abdomen, a mass at the root of the neck had perforated and destroyed the manubrium sterni, and was continuous with a growth in the anterior mediastinum. It was not a separate glandular enlargement, but an enormous spreading mass, obliterating the left innominate and jugular veins. Nodules, the size of a pea, were found in the sub-serous tissue of the

lungs, also in the substance, and the left apex had been directly invaded from the neck. Nodules were found on the surface of the liver, in the cortex of the kidney, and in the heart, in the sub-serous tissue of the diaphragm, and in the supra-renal capsules. Both the larger and smaller growths were tending to break down in the centre.

Secondary or Metastatic Cancer of the Tongue (?).—In MacCormick's case the disease of the tongue was considered to be secondary to that of the breast. In a woman, aged thirty-six, the right breast was affected with scirrhus, and was removed along with the axillary glands. Three months later a pimple was noted, which rapidly grew to a lump in the middle of the right side of the tongue, one inch in diameter. The tongue was removed well beyond the lump, and microscopic examination proved it to be of a "scirrhouss nature." Within a year of the breast operation there was enlargement of the submaxillary and deep cervical glands, which were dissected out, and the patient recovered from the operation, but nothing was said about the microscopic examination. It is seen that the case is by no means clearly demonstrated by the account, and it is not unlikely to have been a primary growth in the tongue, just as a case of Whitehead's had had an epithelioma removed from the lip nine years before.

We think it may be accepted for the present, at least, that carcinoma of the tongue is essentially *a local disease*, certainly not limited to the part in which it takes its origin, but yet surely to that part and the immediately adjacent parts, and to the neighbouring lymphatic glands. It may cover a wide area, yet it is so far local that in the large majority of instances, if these parts to which it spreads, either directly or through the medium of the lymphatics, were completely removed, a cure of the disease might confidently be expected. The more limited the area involved in the disease, the more easy and the less dangerous is it to fulfil these conditions; the more widely spread the disease, the more difficult, the more dangerous the operation, until complete removal becomes incompatible with the recovery of the patient. Under these circumstances, the importance of an early diagnosis cannot be over-estimated. If an operation

is to present a good chance of complete success, it ought to be performed before the disease has extended far back in the mouth, and certainly before the glands have become enlarged. For, although cases are recorded in which complete recovery has followed operations on very extensive lingual carcinomas, such cases are very rare. And still more rare are those in which complete recovery can be claimed after removal of the primary disease and associated glands. Assuredly no cases so advanced as these can be said to offer a good prospect of complete recovery.

10. Diagnosis.

The diseases most *likely to be mistaken* for carcinoma are syphilitic lumps and sores, tuberculous ulcers, simple warty tumours, and simple ulcers and fissures. The resemblance which each one of these diseases at times bears to carcinoma is so great that the difficulty of deciding on the exact nature of the affection is extreme. And it is increased especially by the fact that certain of these diseases are transformed into carcinoma, and the transition is very gradual and by almost imperceptible gradations.

Secondary syphilitic affections are scarcely ever mistaken for carcinoma, but primary and tertiary affections may both closely simulate it. A primary sore upon the tongue is so rare that the question between it and carcinoma will very seldom arise. It is more likely to occur in younger subjects; it may occur as frequently in women as in men; and it occurs usually at or near the tip of the tongue, while carcinoma occurs almost always farther back along the border. The glands are enlarged from the first, or very early; and, at a period of the disease at which few persons would be inclined to operate, secondary symptoms always appear. The conditions of tertiary syphilis require to be distinguished from carcinoma, the unbroken gumma, and, far more frequently, the ulcer left by the breaking of the gumma. The only form of carcinoma for which the unbroken gumma can be mistaken is that in which the disease commences as a lump or nodule in the parts beneath the mucous membrane. Both conditions occur for the most part on the dorsum; in both cases the lump is at first ill-defined, firm, and intimately associated with the tissues of the tongue; in both the

progress of the disease is at first slow, and there is no affection of the lymphatic glands; both affections occur more often in men than women, and more often in adults over thirty years than younger. The points of resemblance between the two diseases are many and striking; indeed, we believe it is sometimes impossible to distinguish between them. But the following points in which they do or may differ should be borne in mind. It is not unusual to observe two or more gummata in the same tongue, while it is extremely rare to observe a second carcinoma. There are not infrequently old scars of syphilis upon the tongue, and associated signs of syphilis in other parts of the body, and there may be a clear history of syphilis. The cancerous lump is not uncommonly associated with a diseased condition of the surface of the tongue, with leucoma or chronic superficial glossitis. On the other hand, it must be remembered that these conditions may be the result of syphilis, and that carcinoma may occur in old syphilitic tongues. It is almost certain, in such doubtful cases, that the effect of treatment will have been tried. The question of diagnosis between a carcinoma and a gummatous ulcer is far more often raised on account of the great frequency with which carcinomas ulcerate, and although the resemblance of one disease to the other is often very close, we do not think there ought to be nearly so great difficulty in distinguishing them. Gummatous ulcers are often met with in the central parts of the tongue, cancerous ulcers chiefly at the borders; the edges of gummatous ulcers are usually undermined, those of cancerous ulcers are raised, nodular, and hard; gummatous ulcers are much more often multiple than cancers; gummatous ulcers are rarely so deeply or so widely indurated as cancers; and the lymphatic glands are scarcely ever affected in tertiary syphilis, whereas they are almost invariably enlarged in connection with cancerous ulcers which have existed long. We have purposely mentioned this condition last, and have entirely omitted any statement of the results of anti-syphilitic treatment, because we are firmly convinced that the diagnosis ought to be made in all but the rarest cases long before the glands have become affected, and because we are just as strongly of opinion that the test of treatment ought

never to be applied in any but the earliest stages of the disease. In all cases in which there is actual ulceration, and the question is raised whether the ulcer is carcinomatous, the *microscopic test* should be applied, and a portion of the wall of the ulcer should be removed, cut in sections, and carefully examined.

A likely part of the ulcer is selected, a pledget of cotton-wool soaked in a 20 per cent. cocaine solution, applied for three minutes, and then a small fragment cut off. This can be hardened very quickly in absolute alcohol embedded in paraffin, and cut in serial section, so that not a bit of the piece is lost, and the whole series of sections can be examined. If time presses, quicker methods may be adopted : the piece may be boiled in a test-tube, sections cut with the freezing microtome, and quickly stained. If the result of the examination is negative, and yet the case is clinically suspicious, another piece should be cut away for re-examination. The first piece cut away may be a mass of inflammatory granulations where the small round cells have overrun and obscured the epithelial growth (Fig. 31). This method of examination should be employed in every doubtful case. It can be used in most instances with success, even when there is no ulceration.

The reason which leads us to speak so strongly in favour of the microscopic examination is that we have seen many cases in which carcinomatous ulcers have been treated as syphilitic ulcers by some of the best clinical surgeons in London, not because they felt sure that the disease was syphilitic, but because they could not feel sure whether it was cancerous or syphilitic. Weeks were allowed to lapse in this manner, until the ulcer had clearly shown that it was not in the least affected by anti-syphilitic treatment, and perhaps had implicated the lymphatic glands. The period at which it should have been removed was allowed to pass, and the operation was undertaken when the prospect of ultimate success was exceedingly small, and when the patient was weakened by the use of large doses of iodide of potassium, and, in one case, by mercurial salivation.

The diagnosis between tubercle and carcinoma is, in many cases, even more difficult than between syphilis and

carcinoma, but the more widely-spread knowledge of tuberculous ulcers which prevails now than formerly has rendered the number of mistakes in diagnosis fewer. Primary tuberculous ulcers of the tongue are rare, and the associated signs of tubercle in secondary ulcers ought to suggest the gravest doubts of carcinoma, even when the symptoms are in other respects suggestive of it. In the section on tuberculous ulcer the diagnosis of carcinoma and primary tuberculous ulcer is discussed, and it is there mentioned that all the primary tuberculous ulcers described and examined by Nedopil had been cut out, under the impression that they were cancerous. To this we may add that the manner of dealing with them thus summarily was the best that could be devised, both for tubercle and cancer, and if the same decisive method were adopted in the case of all doubtful ulcers of the tongue, there would be a striking diminution in the number of deaths from lingual carcinoma.

The difficulty of distinguishing a carcinomatous from a simple warty growth is greatly increased by the fact that the latter usually passes slowly into the former. The disease begins as a simple warty growth, and the warty growth after a time becomes almost imperceptibly a carcinoma. It has been already pointed out that the softer growths almost invariably ulcerate, and that both the softer and the harder warts become more fixed upon the tongue, while the base and the surrounding parts become indurated. And we know no surer signs than these conditions of ulceration, fixation, and induration, of the malignant change which the innocent disease is undergoing.

The same difficulty which attends the diagnosis of a warty growth is met with in distinguishing between a simple ulcer and a carcinoma, for the former passes slowly into the latter, and the exact period at which the transformation is accomplished is not marked by any certain and clearly discernible sign. The age at which the ulcer occurs, the extent and intensity of the surrounding induration, and especially the increase of induration, may do much to make the diagnosis plain. And the fact that the ulcer remains stationary, or actually increases after the cause which produced it has been removed, is another important sign. But, with all care, it

not infrequently happens that a simple or traumatic ulcer has already for a long time been carcinomatous before the fact is appreciated; and it is only when the lymphatic glands are decidedly enlarged that the suspicion of the change is turned into certainty. A microscopic examination in such cases should be made from time to time.

Cancerous Fissures.—It is extremely difficult to diagnose the case when the disease consists in a narrow indurated fissure. The fissure may extend much deeper than appears at first sight, and must be examined by the separation and lifting apart of overhanging edges. The large amount of small-celled infiltration may allow of a small piece being cut or scraped away for microscopical examination without yielding any characteristic appearances. Supposing the disease to be unaltered by syphilitic remedies, both local and general, it is almost certainly either epithelioma or tubercle, exceptionally actinomycosis, or has formed around a foreign body or calculus. In all these cases a local excision of the indurated fissure is indicated, and the question of dealing with the glands can be left until the excised mass has been thoroughly examined.

Carcinoma in the floor of the mouth has to be distinguished from a calculus embedded in the submaxillary or sublingual glands or ducts. Much painful induration covered with foul granulations is met with in both cases. The diagnosis is made by striking the calculus with a needle or exposing it by an incision. The cases in which a calculus has been thus found in the centre of an inflammatory mass have not been diagnosed until the exploration undertaken at the commencement of an operation. The only mistake likely to be made would be to commence an extensive submaxillary removal of glands before the exploration of the tumour in the floor of the mouth. Even if it is necessary to excise the inflammatory mass, owing to the gland being destroyed, this will be a much more limited operation than that necessary in the case of epithelioma.

With regard to the general subject of the early diagnosis of carcinoma of the tongue, we are glad to believe that the attention of the profession and of the public is much more keenly directed to the importance of it than was the case

even a few years ago. Until the last few years the practice was almost universal in the profession to regard a carcinomatous ulcer as probably, then possibly, an ulcer of some other kind until it was very clearly proved to be a carcinoma by unmistakable signs, such, for instance, as the implication of adjacent structures, the adhesion of the tongue to the floor of the mouth, and the enlargement of lymphatic glands. We do not mean to say that all the cases which were seen by surgeons of large experience attached to hospitals were treated in this fashion; yet even among them there was a fatal tendency to do what is commonly termed "give the patient a chance," by treating the disease on the assumption that it was syphilitic or simple. Gradually medical men are coming round to the belief that to "give the patient a chance" means, under such circumstances, to "give the carcinoma a chance" of obtaining a firm and irresistible hold, and to take all chance of complete recovery from the patient. Without doubt the tendency which now prevails among surgeons to operate early, and even in doubtful cases, depends in large measure on the greater knowledge which we have of good and safe methods of removing the whole or a part of the tongue. The operation, especially when only a segment of the organ is removed, is no longer regarded as a very difficult or very dangerous operation. Owing partly to this circumstance, partly to the fact that practitioners of all kinds are beginning to recognise the extreme danger of delay in doubtful cases, we have observed a growing disposition to recommend the removal of what would formerly have been regarded as insignificant warts and lumps and sores. An almost trivial operation is practised, and the fear, nay, sometimes almost certainty, of a horrible death from lingual cancer is averted.

There is only one *prognosis* in all instances of unoperated lingual carcinoma, death; and we are sorry to say that the prognosis is the same for a large proportion of cases treated by operation when the characters of the disease are unmistakeable. The manner of death, and the duration of the disease, in unoperated cases, have already been discussed, and it now remains to consider the value of operation as a means of saving or prolonging life, or of saving pain.

CHAPTER XIX.

EARLY SURGERY OF THE TONGUE.

The Diagnosis of Epithelial Cancer and the Early Classical Operations—Summary of Early and Classical Operations—(a) Before the Sixteenth Century ; (b) In the Sixteenth and Seventeenth Centuries ; (c) In the Eighteenth Century ; (d) The commencement of the Nineteenth Century ; (e) The beginnings of Present-day Operations : C. J. M. Langenbeck, Cloquet, G. Mirault, Jæger, Regnoli, Roux, Séillot, Guthrie, Syme ; (f) Écraseur Methods : Chassaignac's Chain Écraseur, Nunneley's Galvano-Écraseur, Morrant Baker's Whipcord Écraseur ; (g) Dieffenbach, Demarquay, Hilton ; (h) Whitehead's Method and its Fore-runners—(i) Kocher's Operation and previous Operations by Billroth and B. v. Langenbeck ; Iodoform Dressing.

THE diseases of the tongue received little attention until this century ; indeed, they seem to have been scantily treated, out of proportion to the medical knowledge of the time. From this it might be conjectured that diseases of the tongue are now relatively more common than they were in former days. Perhaps the extension of syphilis at the end of the Middle Ages and the introduction of tobacco into Europe may have produced a great increase. It is in accordance with this that we find the earliest and clearest description of cancer, as distinct from vague accounts of scirrhous ulcers and tumours, by Wiseman, in his "Chirurgical Treatises," 1676. He describes two cases, one of an army officer, the other a man, aged sixty, both with a fungating growth in the mouth and enlarged glands, of which they shortly died. After describing how he burnt down the fungating growth with the cautery and so gave temporary relief, he says, "That the cure succeeded not, must be imputed to the greatness of the disease, and may teach others how dangerous it is to neglect the consulting the experienced chirurgeon while the disease is recent and easy to be eradicated."

In following up the gradual emergence of cancer from

among other conditions, we must recognise that it was not until the middle of the century that syphilitic conditions began to be clearly differentiated from it. Thus, if we read the papers by Ferguson (1801), Earle (1823), Travers (1829), we do not find any definite distinctions between syphilis and cancer. It must have been very difficult before the introduction of iodide of potassium, as the free exhibition of mercury led to a further confusion in the diagnosis by setting up acute glossitis. There is a paper by Majendie, published in 1828, with the title, "Ulcérations anciennes de la langue et du pharynx guéries par l'hydriodate de potasse," but the use of iodide of potassium was not general until ten years later. When it was adopted, the administration of mercury was by some dropped altogether. By thus treating the earlier stages of syphilis imperfectly, another hindrance to correct diagnosis may have resulted. This brings the matter up to the time when began the microscopical examination of the growths. Sir James Paget, in his "Lectures on Surgical Pathology," 1847—1852, lecture xxxii., Epithelial Cancer, says in one footnote: "I described the papillary origin and construction of these cancers in 1838" (*Medical Gazette*, xxiii., 284). In another footnote: "We owe the ability to interpret these appearances, which illustrate many things interesting in the general physiology of cells, almost entirely to Virchow (in his *Archiv*, iii., 97) and Rokitansky (in his *Pathologische Anatomie*, Bd. i.)."

With regard to the early and classical operations it is not easy to compare them, for they were not all done for cancer; some were certainly not cases of cancer at all, others are very doubtfully so. Thus Pimpernelle, who died in 1658, cut away a tongue which had become gangrenous following apparently mercurial glossitis. Many of the so-called cancers were very minute. Home removed by the ligature *en masse* method one which was the size of a pea, and about which he first had a consultation with Cline. Several of the early operations were cases of lymphangioma and macroglossia in young girls and boys, existing for many years or dating from birth. As late as 1839 Arnott termed a case of this kind malignant, but it was not what

we mean now by cancer; it was, from the description, a congenital lymphangioma of the left side of the tongue in a girl aged fifteen, and other earlier cases will be mentioned by Hoffmann, Büttner, Bieshaar, Siebold, Mirault (father and son), and Regnoli. As regards a clear distinction from syphilis and the confirmation of the diagnosis by microscopical examination, the description of Syme's classical case is lacking. Syme had lost his first two cases in 1857 and 1858, and became for the time an opponent of the operation; when, in 1865, a man, aged fifty, who had suffered with his tongue for many years, especially the last three, presented himself, with his tongue swollen, indurated, tuberculated, and brown like the back of a toad and fixed in the floor of the mouth. The tongue was removed by the method introduced by Sédillot in 1844. The lower jaw was divided and the tongue cut away with the knife as far back as the hyoid. But Syme's description does not inform us about any ulceration or special signs of cancer, nor as to the naked eye or microscopical description of the material removed.

The major operations on the tongue, except for a few exceptions, were not performed until within the last five-and-twenty years. Until decomposition in the mouth and septic infection were prevented by the discovery of antisepsis, an operation on the tongue was a very hazardous feat. When operations for macroglossia in healthy young people were followed by fatal sloughing and septicaemia (e.g. Siebold's case, from which the figure of the lower jaw on p. 271 is taken, died at the end of a month; Liston's case died of pyæmia), what was to be expected in a patient exhausted by cancer?

In the following summary of early operation the original sources have been again referred to. There was a curious error in the previous edition, copied through Holmes' "System of Surgery," from Wölfler's paper. Just, the earlier writer, is correct on the matter. The date of Guthrie's paper, 1856, got changed somehow to 1756, and so Wölfler concluded that Guthrie was the first English surgeon to remove the tongue. The reference is to the case published in the *Medical Times and Gazette* of June 21st, 1856, after

his death, operated upon by G. J. Guthrie, the distinguished Peninsular and Crimean surgeon, who was born May 1st, 1785, and died May 1st, 1856. This is an instance of the difficulty of maintaining accuracy in matters of medical history.

(a) *Before the Sixteenth Century.* — Hippocrates, as regards the tongue, chiefly treats of the clinical signs of general disease which it exhibits. He also recommends bleeding from the lingual veins, the opening of an abscess at the base of the tongue by a bistoury guided by the finger. He speaks of cancer exulceratus, and the value of the cautery when other things would not cure. He also mentions a case in which the tongue was affected, following disease of the base of the skull.

The general view of cancer is summed up in the aphorism, "It is better not to apply any treatment in cases of occult cancer, for, if treated, the patients die quickly; but, if not treated, they hold out for a long time."

Second and Third Centuries.—Galen mentions a case of simple or muscular macroglossia, as quoted on p. 275. His "Humoral Pathology" is said to have prevented the active treatment of malignant ulcers for a long period. He believed that cancers were due to black bile, and that all ulcers due to black bile were incurable.

Celsus gives the account of "Diseases and Surgery of the Tongue," which was copied without being added to by subsequent writers. In lib. vi., cap. xi., is an account of ulcers of the mouth and of thrush; in cap. xii. the bland treatment of ulcers of the tongue, etc.; in cap. xv. an account of gangrenous ulcers of the mouth and tongue which, when simpler means did not cure them, were to be cauterised or excised. Lib. vii., cap. xii., paragraph 4, describes the division of the frænum, after seizing the tongue with a volsella, taking care to avoid haemorrhage. He knew of a case in which no improvement in speech followed. Paragraph 5 describes abscess and ranula under the tongue.

Fifth Century.—Cælius Aurelianus recommended scarification for enlarged tongue, and the other methods mentioned on p. 274, which caused so much suffering, were also generally employed.

These are the limits within which the surgery of the tongue was confined.

Seventh Century.—Paul of Aegina used an instrument for controlling haemorrhage from the tongue.

Tenth and Eleventh Centuries.—Albucasis, or Abulkasim, the Arabian. The surgery of Albucasis deals only with: Division of the frenum, extraction of ranula, and the application of the cautery to early cancer.

(b) *In the Sixteenth and Seventeenth Centuries.*—Fabricius ab Acquapendente, in the chapter on the surgery of the tongue, treats of: Depression of the tongue by a spatula, the fur on the tongue, the division of the frenum, anent which he deplores the custom of midwives, who, as a matter of course, tore through with a sharp finger-nail the frenum of an infant as soon as it was born (p. 31); also ranula, in which he follows Celsus.

Ambrose Paré made the first advance after Celsus by mentioning three cases—two in boys and one in a man—of the successful application of immediate suture, so that union was obtained of pieces of the tongue nearly bitten off by falls upon the chin. On the other hand, he not only advised division of the frenum, but also the further tearing by pushing the tongue upwards and backwards with the finger—a method which has proved fatal to many children. For ranula he used the cautery in preference to the scalpel.

When Fabricius Hildanus was called into consultation on the case of a man, aged sixty-six, who had a cancerous ulcer of the left side of the tongue, he directed the treatment towards counteracting the supposed cause—the “black bile” of Galen. The caustics which had been applied were stopped, and the patient improved for a time, but afterwards caustics were again used, and he got worse. Excisions now began to be practised occasionally.

It has been mentioned above that Wiseman used the cautery in two cases of undoubted fungating cancer. Surgeons at this time must have been well acquainted with the results attending the barbarous punishment intended to prevent free speech by cutting, burning, or tearing off the projecting portions of the tongue (p. 52). Many recovered, and

were able to speak well afterwards. Cases of ill-developed tongues were recorded in which there was good speech (p. 27). But also there were numerous cases of gangrene of the tongue after smallpox (p. 76), and in venereal disease as a consequence of the free administration of mercury. Louis speaks of the frequency with which this occurred in the Military Hospital at Metz, where venereal disease was treated by mercurial inunctions to salivation.

Pimpernelle, who died in 1658, cut away the gangrenous half of the tongue which had followed the use of mercury. Healing followed, and the patient spoke well.

Walaeus cut off successfully the superfluous portion of the tongue from a case of macroglossia. The girl was a patient of Bartholin's, and her tongue protruded a hand-breadth from her mouth.

Petrus de Marchetti, in 1664, excised by cutting and burning a tumour the size of a hazel nut, situated under the tongue in the position of ranula. The tumour was hard, but fleshy; it was not hollow, nor did it contain any substance.

De la Motte, in 1685, ligatured with silk the pedicle, which was as thick as the little finger, of a tumour growing on the tip of the tongue.

Vicary, the surgeon to Edward VI. and the Queens Mary and Elizabeth, has, in "The Surgeon's Directorie," a great number of local remedies for "canker of the mouth."

(c) *In the Eighteenth Century.*—There was no appreciable advance with regard to the surgery of the tongue during the eighteenth century beyond the stage already reached.

Petrus Menonista (of the sect of the Menonites), a surgeon of reputation, cut away an ulcerous hardness which had recurred after a previous excision with a curved bistoury, and applied the cautery, whilst Ruysch held out the tongue with a piece of linen and guarded the cheek with a wet cloth. The patient was an old woman, and the growth did not return.

Marescotti, of Modena, also successfully cut off a large cancerous ulcer from the left side of the tongue.

Heister, of Helmstadt, excised a scirrhoue cancer with a scalpel, whilst an assistant held out the tongue.

But he said that the disease must be cleanly extirpated, otherwise it would rage worse than before. In order to do so, it was necessary to remove some of the sound parts of the tongue also.

Buxdorf used scissors instead of a knife for the extirpation of a cancer from the right half of the tongue of an old man, which he did by drawing out the tongue with forceps and cutting it out. He arrested the haemorrhage by applying ice and the cautery. In consequence of a delay in healing, he applied the cautery again three times, and healing only occurred after four months. Five months later there was recurrence in the parotid and sublingual glands.

Cases of macroglossia are also recorded. Hoffmann, of Stockholm, excised the projecting portion of the tongue from a girl aged ten. The tongue had been too large from birth; it projected four inches, and was two inches thick outside the mouth. He used a special instrument, which clamped the tongue and allowed of ligatures being passed through holes in it; but he had to complete the arrest of haemorrhage by means of the cautery.

Büttner, of Königsberg, removed a "fleshy growth" from the tongue of a woman, aged twenty-seven, which had been growing since she was three years of age. The part projecting outside the mouth was three inches long, three broad, and two thick.

Maurent gives two plates of patients with prolapsed tongue, macroglossia, and displacement of the jaw. A surgeon tried removal in one case, but was stopped by haemorrhage, for the arrest of which he recommends ice.

Bieshaar used two semicircular incisions for the removal of a tumour the size of a nut from the middle of the tongue of a young girl. She had been attacked by frequent swellings, especially along with menstruation. After severe inflammation there was a good recovery. He preserved the tumour in spirits of wine, and thought it cancerous, but said that many would doubt this.

C. C. von Siebold operated, in 1791, on a case of macroglossia by strangulating it with ligatures. A weakly girl, aged ten, whose mother had been frightened during

pregnancy by seeing a dead cow, had the tongue protruding four and a half inches from the teeth, being three inches broad and two-thirds of an inch thick. After making incisions around, a compressing ligature was applied, which gradually cut through, and the black slough was removed on the twenty-fourth day. Pyæmia occurred on the twenty-seventh day, followed by death. The skull of this patient is reproduced on p. 271. Virchow examined the preparation preserved in the Würzburg Museum, and found that the macroglossia was the result of lymphangiectasis, and not of simple muscular hypertrophy.

Louis wrote the chief memoir on the tongue during this century. He described one operation, the snipping off of a tumour the size of a small nut from the middle of a young man's tongue, afterwards applying caustic.

Bertrand removed a large polypus from the base of the tongue by using a double ligature.

Turner, in his "Art of Surgery" (1732), mentions that he opened a ranula in a girl, and removed a calculus; also he sutured the tongue in a girl who had nearly bitten off the tip in an epileptic fit.

Dr. Walter Harris, in his lecture given in the Royal College of Physicians of London on October 7th, 1720, says: "The excision of cancers of the mouth and lips, and especially of the tongue, all involve the greatest danger to life. But if anyone is exceedingly wearied with such tumours, and especially dejected in mind, whilst he is prepared to bear equably whatever may happen, he should not be denied the trial of the operation of excision." He goes on to relate how a kindly neighbour of his who had neglected palliative treatment, on the advice of importunate friends, called in a famous surgeon, who at once persuaded the patient to have the cancer of the tongue excised. It turned out that this operator had lost both his previous cases. "A few days afterwards this case also went to the majority, and joined the two preceding ones in misfortune, whence no one ever returns to overcome the malpraxis of ignorant physicians and of rash surgeons."

Benjamin Bell, in his "Surgery," 1786, has a chapter on ulcers of the mouth and tongue and extirpation of the

tongue. He cut round the growth, transfixed behind it with a row of gold pins or crooked needles, passed over these a wire loop, threaded through a double canula, and twisted up. This is an early instance of the écraseur. He said that the actual cautery is the last resource, and concludes, as regards extirpation : "It ought not to be attempted by every operator; for as it is always attended by a very sudden discharge of blood, the application of means proper for the stoppage of this and the obviating the effects of fainting and other unexpected difficulties which sometimes occur, require that steady deliberate coolness which a natural firmness of nerves, conjoined with much experience, alone can give."

(d) *Nineteenth Century*.—At the beginning of this century two English surgeons record operations on simple tumours, but apparently no case was cancerous. Home, in 1803, described cases treated by ligaturing *en masse*, one a nævus in a boy, another a tumour the size of a pea in a woman, and a third of the same size in a man, removed after consultation with Cline. The sloughs included by the ligatures came away from the fifth to the ninth day, and this was followed by healing.

Inglis, in 1805, operated upon a vascular lymphangioma in a man, aged twenty-four, which had been first noticed at the age of five, being then of the size of a small pea. It was surrounded by ligatures. On one of the ligatures becoming loose on the fourth day, another was applied. From the tenth to the thirteenth day there was much haemorrhage. In the fifth week the tumour separated, in the sixth week another application of ligatures was required to finish the removal, and healing was completed ten weeks after the first operation. The second case was a vascular angioma with lymphangiectasis near the tip of the tongue in a girl, aged ten; it was surrounded by ligatures. The sloughs came away on the ninth day, and healing was complete in five weeks.

This painful and dangerous method of strangulation continued to be employed. It was applied to cases of cancer where it had not even the one redeeming method of ultimately curing. Illustrations occur in the text-books; for

instance, in Liston's "Practical Surgery," fourth edition, 1844, p. 293, it is the only method shown; also as late as "Erichsen's Surgery," eighth edition, 1884, vol. ii., p. 641.

A more fearfully painful method still was the use of caustics. The tongue was drawn out, stabs made round the growth, and into the punctures arrowhead-like pieces of chloride of zinc were inserted. Girouard of Chartres, in 1857 obtained healing after thirty-eight days with a good result in a case of "cancer." Maissonneuve recommended the method in 1858.

(e) *The Beginnings of Present-day Operations.*—C. J. M. Langenbeck, in 1819, commenced the advance in the surgery of the tongue by introducing the wedge-shaped operation, applying, as he says, the V-shaped operation already in use for epithelioma of the lower lip, and so he obtained immediate union by suture, as Ambrose Paré had done for injuries. He applied no ligatures, and the sutures were removed on the third day.

Major, in 1827, split the tongue down the centre and applied strangulating ligatures to the diseased half through the mouth.

Cloquet, in 1827, commenced the methods of attacking the tongue from below the jaw, but it was in order to apply strangulating ligatures in a late case of cancer and ended fatally; the case is reported by Velpeau. A man, aged fifty-one, had had several syphilitic attacks, following which a fungating ulcer appeared on the tongue, and the glands became enlarged. Cloquet passed the strangulating ligature through a small incision below the jaw round the base of the tongue, using a curved needle on a handle, so as to strangulate the diseased part of the tongue. The patient died four days later of broncho-pneumonia, the glands breaking down and suppurating. The ligatures included all the diseased part of the tongue.

Arnott, in 1839, used Cloquet's method of passing strangulating ligatures from below the jaw, and was successful; but his case was clearly one of macroglossia or, rather, lymphangioma of the left half of the tongue, in a girl aged fifteen. The diseased portion sloughed away and healing followed.

G. Mirault, in 1833, first ligatured the lingual artery in the neck as a preliminary to removing a tumour of the tongue. A good deal of controversy seems to have arisen as to the originality and method of carrying out the operation. In the first place J. F. Mirault, the father, had removed, in 1813, a fungating and varicose tongue, which projected eight inches beyond the lips. The patient, a man aged thirty-four, had had a large tongue all his life. Three ligatures were used, and later on a wedge-shaped piece taken out of the lower lip. In the second place Velpau and Blandin had described the method of ligaturing the lingual artery on the dead body, but had not apparently applied it to the living subject. Thirdly, Cloquet's method had already been published. The case which G. Mirault (the son) operated upon was apparently not cancer. A girl, aged twenty-three, in whose case syphilis could be excluded, had a fungating tumour with much swelling of the tongue, noticed for five months, and it had been much irritated by leeching and other treatment. Perhaps it was, as in other cases, a lymphangioma. On May 17th he attempted to ligature the left lingual artery, but failed to find it. On the next day, with the girl sitting in a chair, he tied the right lingual artery, following which there was some sloughing of the fungating tumour and the formation of a hollow ulcer. On June 6th secondary haemorrhage occurred from this ulcer, and so he proceeded to put strangulating ligatures on the left side, passed from the submaxillary region, after Cloquet's method. On June 16th he applied the strangulating ligatures also on the right side—*i.e.* the side upon which he said he had done the preliminary ligature. Healing followed twenty-seven days after.

G. Mirault certainly made the attempt to apply a preliminary ligature to the lingual artery in the neck. How far the idea was his own, and how far he carried it out, we have attempted to describe.

Jæger, in 1831, was the first to divide the cheek (Fig. 35) in order to obtain more room for cutting away the tongue. A man, aged fifty-one, had cancer of the left half of the tongue as far as the base, which had extended to the left tonsil and floor of the mouth. He divided the cheek from the angle of

the mouth, drew the tongue out, cut round the ulcer and then cut away with strong harelip scissors. The cancerous part on the tonsil and floor of the mouth was removed with Cooper's scissors. The ranine artery was tied, and several small vessels twisted. Sharp fever followed, but the wound of the cheek and tongue had healed on the ninth day.

Regnoli of Pisa, on May 18th, 1838, performed the removal of the tongue through the floor of the mouth by the submental incision. It was done on a girl, aged fourteen, who had not menstruated, and was seen with a tumour the size of a hen's egg extending from the anterior third of the tongue backwards to the base, which so occupied the fauces that the posterior limit could not be made out until the finger was inserted. The tumour occupied the whole thickness of the tongue, leaving a little of the right border free. The surface of the tumour was granular, it bled, especially during mastication and on examination with the finger, blood spurting out as from arteries. The mass was hard, nodular, painless; mastication, swallowing, speech, and breathing were hindered, especially the latter. The tumour had certainly existed two years, but the patient's intellect was dull and her speech difficult to understand. The disease was certainly not epithelioma, but there is no account of an examination of the tumour after removal to assist one in recognising its nature.

She was seated in a chair or stool opposite the window, with the head leant back against the breast of an assistant standing behind her. Regnoli then made, with a curved bistoury, an incision in the skin of the neck, from the middle of the symphysis of the jaw to the middle of the hyoid bone. (Fig. 33.) He then made two other incisions, one on the right, the other on the left, beginning at the chin end of the first and running outwards in the line of the base of the lower jaw as far as the anterior border of the masseter, so that the facial artery was not wounded. These three incisions formed a T, and the two flaps, which included skin, cellular tissue, and the platysma myoides, were dissected up, so that the muscular layer was exposed. A straight bistoury was now thrust from below upwards behind the symphysis of the jaw, so as to divide the

insertions of the geniohyoid and geniohyoglossal muscles and the mucous membrane, until its point appeared in the mouth behind the incisor teeth. Through the same incision a blunt-pointed bistoury was passed from below upwards, and turned first to the right, then to the left, so as to divide the anterior insertions of the digastrics, the mylohyoids, and the mucous membrane of the mouth as far as the anterior

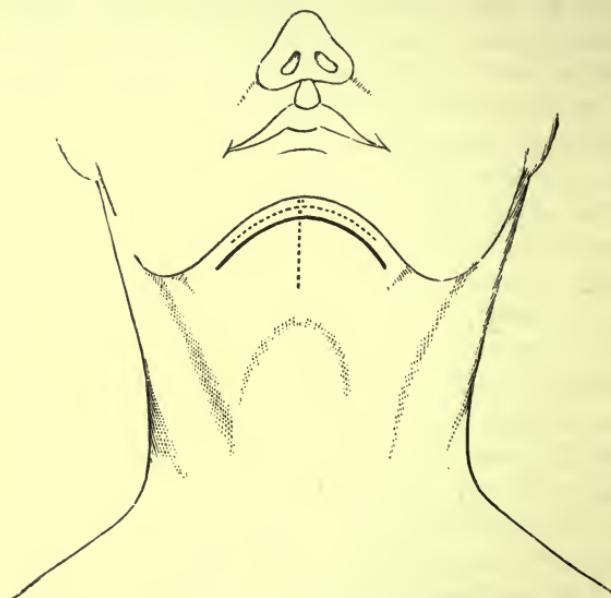


Fig. 33.—REGNOLI'S SUBMENTAL INCISION.

pillars of the palate; three or four vessels were tied. The tip of the tongue was seized with a pair of forceps and drawn down through the opening so that the whole tongue lay in the front of the neck. Regnoli seized it with his fingers, drew it as far down as possible, and surrounded the base by transfixing ligatures in order to guard against bleeding from the main arteries of the tongue. After he had completely encircled the tongue and the disease with ligatures, he cut off with small scissors all the parts beyond the ligatures, which were left long hanging out of the wound. The cutting was very cautiously performed in order to guard against haemorrhage, and the surface of the stump was touched with the hot iron in order to arrest the oozing.

The stump was then returned into the mouth. Not a drop of blood had passed into the larynx. The external wound was not completely closed, in order to allow free drainage from the mouth, but was partly brought together with strapping and bandage. The patient made a good recovery, and healing was completed in six weeks. The stump hypertrophied, and the patient spoke and swallowed well and was in better health than before the operation.

Roux, in 1839, is the first to describe a major operation for the removal of a carcinomatous tumour such as might be carried out at the present time. A man, aged thirty-five, had had the disease for five months, and it occupied the entire left half of the tongue. It had commenced as an ulcer, and was attributed to smoking. The left lingual artery was first tied, then the tongue was freed from the floor of the mouth, from the lower jaw and from the anterior pillar of the fauces. It was then split by plunging into it a bistoury from its under surface, and the entire left half of the tongue cut away without haemorrhage. The patient spoke immediately afterwards without difficulty. On the tenth day the ligature came away from the artery, and the patient afterwards left the hospital well, a fine scar having formed in the mouth. Comparing this account with that of Mirault's, it is evident that Roux's case first demonstrated the value of the preliminary ligature of the lingual artery.

Sédillot, in 1844, divided the lower lip in the middle line and then the lower jaw at the symphysis by an angular cut so that it should dovetail in when brought together again. Roux is said to have already done this operation, except that he divided the lower jaw vertically (*Dict. de Méd. et de Chir. Prat.*, T. xx., 1875, p. 80); but we cannot make out where the original account is to be found. Sédillot, after separating the rami of the lower jaw, divided the left half of the tongue from the soft parts of the mouth, split the tongue down the middle, and cut away the left half immediately in front of the epiglottis. The lingual artery was tied without difficulty. The patient was a woman in good health; the jaw was fixed by a gold plate and by silk threads between the teeth. By the ninth day the lip had healed, and the case was practically well.

Keith, in 1848, removed a large fungous tumour, which occupied the middle two-thirds of the right side of the tongue, from a woman, aged sixty-six. A warty excrescence had formed on the tongue four years before, commencing just behind the anterior pillar of the fauces, and had become a ragged ulcer, extending forwards nearly to the tip. With the patient seated in a chair and the head held, an assistant compressed the right carotid, and the tumour was cut off at one sweep with the knife. There was for the moment free haemorrhage, for the patient moved and the carotid slipped away from the assistant's fingers; but the dorsal and sublingual arteries were tied, and healing took place in a month. Unfortunately, the patient caught a chill going home, of which she died. Guthrie, in 1856, followed this method. In a man, aged seventy, he cut off the tip of the tongue and a part of the left side, and afterwards tied four bleeding vessels and stopped the capillary oozing with the cautery.

Syme, in 1857, and again in 1858, repeated Séillot's operation. Both cases were unsuccessful, but Fiddes followed with a successful case. After dividing and separating the two halves of the jaw, he had the tongue firmly stretched upwards and forwards by an assistant, who grasped it with a volsella. Then with scissors he cut away the tongue from the floor of the mouth with short cuts until he reached the lingual arteries on either side. As soon as these vessels were tied the tongue was cut away from the hyoid bone.

(f) *Écraseur Methods*.—At this time removal by écraseurs was introduced, and although excisions of the tongue came to be performed more frequently, the methods were not of permanent advantage and have been superseded. Surgeons were drawn to use them by the dread of primary haemorrhage and the rapidity with which the operation could be carried out. But all écraseurs proved objectionable, partly owing to the complicated apparatus, partly to the bruising, followed by septic infection and secondary haemorrhage, and also from the difficulty of preventing the noose as it was tightened from slipping forwards and encroaching upon the tumour.

As mentioned on p. 354, Benjamin Bell used a double canula, through which the wire for the ligature *en masse* could be threaded, and afterwards twisted up. Pins, or curved needles, thrust through behind the growth prevented the loop from slipping forwards. In 1852 Chassaignac first used his chain écraseur at the Hôpital St. Antoine. He did not tighten the chain so as to cut completely through until the end of forty-eight hours. In subsequent operations the time for cutting through was twelve to twenty minutes. The écraseur was a powerful apparatus which crushed through the tongue, leaving the stump bruised and lacerated. Curved needles were thrust through to keep the loops from slipping forwards. One, two, or even three écraseurs could be applied—*e.g.* one to cut across the tongue, one to divide it down the middle, and one to divide it from the floor. In order to pass the chain an armed needle was thrust through, withdrawn empty, and the ligature then used to draw the chain through. This was done through the mouth, and also from below the chin, by making punctures in the skin of the middle line. The operation was also combined with Sédillot's division of the jaw. Nunneley of Leeds, from 1861 to 1870, obtained remarkably good success as far as the immediate results were concerned. Thus, when he contested Symes' dictum that the excision of the tongue was an unjustifiable operation, he had operated on five patients, who had all recovered.

The galvano-écraseur was also introduced about the same time. It was written about in the *Lancet* in 1851 by Harding and Waite, and by Marshall in the "Medico-chirurgical Transactions." Middledorpff, in 1854, wrote a monograph on "Die Galvano-caustik." The difficulties in its use were the troublesome apparatus and the uncertainty as to the heating of the wire. The current might at any time cease and leave the surgeon with a cold wire écraseur, or get too hot and char the tissues, cut through the vessels and leave them bleeding, or fuse outright. Hence the use of the galvano-cautery was attended with dangers from primary and secondary haemorrhage. An improved apparatus is in common use for small polypoid growths of the surface of the tongue; it has mostly fallen into disuse for larger operations. Bottini, however, in

1894 published a hundred cases in which the galvano-cautery had been used, and Ostuani, in 1897, reports that Bottini continued to use it.

The best immediate results with the écraseur appear to have been reached by Morrant Baker. He used whipcord for the noose and tightened up slowly, taking fifteen or thirty minutes to cut through, at the end of which a tough strand was left containing the lingual artery, so drawn out that a ligature could be applied on the face of the stump, and the strand cut across between the ligature and the whipcord noose.

But Baker also much improved the method of applying the noose, by adopting the preliminaries of Whitehead's operation: the mouth widely opened by a gag, the tongue well drawn out and freed from the attachment to the genial tubercles, the floor of the mouth and the anterior pillar of the fauces. In his later operations Baker mostly divided the cheek so as to get more room for working the écraseur. Then two or more strong curved needles were thrust through the base of the tongue well behind the growth, which prevented the noose, passed below them, from slipping forwards towards the disease, when tightened.

The recoveries which followed were most satisfactory, more than forty with only four deaths. Yet his latest communications show that he regarded the operation as essentially a palliative one. Thus, in 1884, after recording three cases of removal by the whipcord écraseur, in which the cheek had been divided in all three and the jaw in one of the cases, also the glands were enlarged in all three, yet no special dissection was made to remove them, Baker remarked as follows: "In all the cases there might be a fair expectation that the ulcerating tumour would never reach the same dimensions as originally, and that not improbably recurrence might not happen to any extent in the mouth, but in the lymphatics, which were out of reach at the time of the operation."

(g) There were other operations which excited a momentary interest, but in which conclusions had been hastily arrived at, and no development of surgery can be traced from them. Dieffenbach, in 1841, revived the old superstition that

stuttering was connected with undue fixation or largeness of the tongue. Following the early publication of his case, in which he reported an improvement—a merely temporary and superficial one—Just says that more than two hundred cases were operated upon in England and France. The fraenum or supposed bands were divided, or wedge-shaped pieces cut out and the wounds united by suture. Finally, a case of Dieffenbach's died of recurrent haemorrhage. The operation was, of course, wholly irrational.

Another group of operations were those connected with ligature of the lingual arteries. The cutting off of the blood supply to some tumours, generally of an unknown character, had been noted to be followed by their disappearance. Hence it was thought that real cancerous tumours might be cured in this way.

Demarquay, in 1866, described a characteristic case under the title "Atrophy of a voluminous Tumour of the Tongue, obtained by Ligature of the two Lingual Arteries." A man, aged forty-eight, had an enormous tumour which hindered respiration, deglutition, and phonation. Both linguals were ligatured, the tumour completely disappeared, and the man entirely recovered. But no evidence is added as to the duration of this tumour, nor is anything said as to its special clinical characters. It is impossible to do more than conjecture that the tumour was inflammatory and recent in origin. The operation as applied to cancer might temporarily reduce congestion, and is applicable to occasional cases of irremovable disease where there is continuous haemorrhage. It is certainly wrong to tie the linguals days or weeks before the tumour is removed, for the operation cannot arrest growth, but a free anastomosis is developed, so that when the surgeon comes to remove the tongue his anatomical knowledge fails to guide him to the points where the blood is entering the tongue; there is more bleeding and more vessels to secure.

It has been mentioned (Chapter XV.) that the bilateral ligature of the linguals may be of service in some cases of simple muscular macroglossia, but will not do more for the lymphangiomatous form than reduce congestion temporarily.

Hilton, in 1850, first divided the lingual nerve opposite

the molar teeth in order to relieve pain in inoperable cancer. Not very much good was done, and the results of subsequent attempts have been but indifferent. Instead of simply dividing the nerve, pieces have been cut out higher up, from the mouth or by trephining the ramus. But this does not touch the question of the glossopharyngeal nerve and the severe pain felt in the ear. Also, there are other means of relieving the pain than by submitting the patient to an operation, with the results of which he is sure to be disappointed. (Chapter XXII.)

(h) The operations employed at the present time and described in the following chapter are divided into two groups.

The excision of the tongue through the mouth, or buccal operation, is commonly known by the name of Whitehead's operation. This name is applicable because the procedures described by Whitehead, in his papers from 1877 to 1892, are, as a matter of fact, very closely followed, barring exceptional cases requiring special modifications. The genesis of the peculiar features of the operation may be traced in earlier cases. Thus, Roux's operation in 1839 is the first clear demonstration of the plan of freeing the tongue from the floor of the mouth and drawing it well out; the value of this was emphasised by Sir James Paget, to whom Whitehead refers.

Instead of amputating the tongue by one sweep of the knife, as did Keith and Guthrie, and later Fergusson, scissors were employed by Fiddes, making small snips until the blood-vessels were reached.

By this operation the immediate mortality following excision has become exceedingly small, and the operation has been generally employed. But attention has been more and more directed towards obtaining permanent results by dealing with the infected glands.

(i) The second group of operations which provide for the removal, not only of the primary disease, but of its extensions beyond the tongue and of the widely infected lymphatic glands, with the object of obtaining a permanent cure in an increasing number of cases, are known collectively as the submaxillary, extra-buccal, or Kocher's operation.

With regard to the use of Kocher's name, there is, in the first place, the operation as described by him in 1880, which had for its aim the thorough application of the Listerian methods to operations for the removal of the tongue; secondly, the Professor's description of his method in the most recent edition of his book on "Operative Surgery," in which are contained recommendations as to preliminary tracheotomy, division of the jaw, and the use of the cautery knife in removing the disease, in order to avoid septic infection of the cut surface, from which many surgeons would differ; and thirdly, the general use of the term Kocher's operation for any and all the variations which surgeons have introduced into submaxillary operations.

Kocher's paper was a development of the experience gained by Billroth and his followers from 1861 onwards. The division of the check by Jaeger in 1831, the preliminary ligature (?) of the lingual artery by G. Mirault in 1833, at any rate by Roux in 1839, also the method of freeing the tongue by the latter, the division of the symphysis of the lower jaw by Sébillot in 1844, have been referred to. In 1859 B. von Langenbeck temporarily resected and turned aside the nose to remove a naso-pharyngeal polypus, and again in 1860 temporarily resected the upper jaw. These operations suggested to Billroth in 1861 the temporary resection of the lower jaw, between the *right* canine and the *left* molar teeth, for a recurrent cancer of the tongue. The patient recovered. At first there was some trouble in keeping the resected portion of the jaw in place, but afterwards union became firm. Billroth's second case required division of the jaw at the anterior borders of the masseters, with retraction of the proximal fragment. But the growth had extended deeply to the neck, an extensive removal was carried out, and the patient died on the third day from septic pneumonia. Bœkel followed with another case of resection of the jaw, the fragments being united, but with some partial necrosis going on. The improvements and extensions made by Billroth and those who followed will be mentioned in the statistical results of operations.

But a very notable advance was made by the introduction of iodoform and gauze into use in Billroth's Clinic.

Mikulicz, in 1882, describes the improvement following the use of iodoform and iodoform gauze. Wœfler, in his paper in 1881, does not mention the use of iodoform, but refers to a number of caustic materials, and gives the preference to permanganate of potash in powder. Iodoform was described from the pharmacological standpoint by Rhigini in 1861, and was employed for venereal and gynaecological purposes; also by Lister for foul ulcers of the leg. In the first twelve cases in which iodoform was used for the tongue healing followed, although most were very extensive removals.

Von Langenbeck practised the removal of the back of the tongue when it had implicated the tonsillar region by lateral pharyngotomy and resection of the jaw. This form of operation is known in Germany as Von Langenbeck's; in English books it is often called Kocher's (see next chapter).

CHAPTER XX.

EXCISION OF THE TONGUE.

The Buccal Operation : (a) Special Preparation of the Patient ; (b) Apparatus ; (c) Assistance ; (d) Position of Patient ; (e) Anæsthesia, Tracheotomy, Laryngotomy ; (f) V-shaped and other Local Excisions ; (g) Unilateral Excision, partial and complete ; (h) Bilateral Excision, partial or total ; (i) Examination and Dressing of the Stump ; (j) After-treatment—The Submaxillary or Extrabuccal Operation—“Kocher’s Operation,” Kocher’s Antiseptic Method : (a) Excision of a Limited and Early Carcinoma of the Tongue, with all the Lymphatic Glands liable to be Infected in the Upper Part of the Neck, at two Operations ; (b) Cancer affecting the Floor of the Mouth and possibly the Lower Jaw (Langenbeck’s Operation) ; (c) Cancer of the Front of the Floor of the Mouth (Regnoli’s Operation).

1. The Buccal, often called Whitehead’s Operation.

(a) *Special Preparation of the Patient.*—It is almost hopeless to attempt to completely disinfect the mouth before operation, but the following measures are employed by some surgeons: During the few days intervening before the operation attempts are made to diminish as much as possible the septic condition of the mouth. The patient, about every three hours, and after taking food, rinses out his mouth thoroughly with a mouth-wash—permanganate of potash solution is the strongest antiseptic, having at the same time a non-irritating character. The patient cleanses his teeth as thoroughly as possible, using carbolised tooth-soap or carbolised tooth-powder. But more thorough measures are desirable whenever they can be carried out. The mouth is gently wiped out, especially the pockets, with soft pledgets of wool or bits of marine sponge soaked in bicyanide of mercury, 1 in 1,000, but the perchloride may be used, if preferred. Over the vascular granulations the solution is gently painted with a camel’s-hair brush; but if the growth is covered by hard, nodular epithelium, it will not hurt to rub it with a soft sponge, and try to clear all the fur and

débris out of the sulci. In doing so no free fluid should escape into the mouth, and when the application is finished the patient well rinses out the mouth with water. The application may be made twice, or more often, in the day, the permanganate being used freely in the intervals; this may help diminish the septic decomposition in the mouth, and reduce the swelling and pain and salivation which this decomposition keeps up over and above that actually due to the growth. If possible, the teeth, and especially the carious ones, are actively treated with the same object. The healthy teeth are sealed, the partly carious teeth which can yet be preserved have their cavities cleaned out and a temporary filling inserted, those that are carious, also all stumps or others which may possibly irritate the future scar, are extracted and the sockets wiped out with an antiseptic.

The patient's feeding should be considered, as regards strengthening him somewhat for the operation, especially if he has been nearly starved beforehand from pain in mastication and difficulty in swallowing. He should then rest in bed, have nutrient enemata, or be given liquid or soft food according to his power of swallowing. The relief granted by the disinfection in the mouth may allow him to take food much better than he had done for weeks before. Of course, if the patient is still strong and active, he should keep up his usual habits and outdoor exercise until the operation. Besides this, the manner of giving food after the operation may be practised. A piece of rubber tubing is placed on the spout of a feeder, and the patient lets a little water into his pharynx at a time by pinching the tube between his thumb and finger, and relaxing for a moment to let that amount of fluid flow which he can then swallow; or an oesophagus tube may be passed, after painting or spraying the back of the pharynx with cocaine; an ordinary black olive-headed urethral catheter is generally the most useful. In this way the food may be taken better after the operation; indeed, by placing fluid food in the pharynx, or feeding by an oesophageal tube, it will be more easy to improve the foul state of the mouth. The use of the above methods will vary with different patients,

some of whom are, at least outwardly, stolid; others are the better pleased the more is done for them; and others, if too much fuss is made, get frightened and decline the operation.

An exhausted patient may have a nutrient enema, with or without brandy, just before the operation.

(b) *Special Preparation of Apparatus; Table.*—The table required is most suitable when it corresponds to the height of the surgeon so as to bring the mouth of the patient,

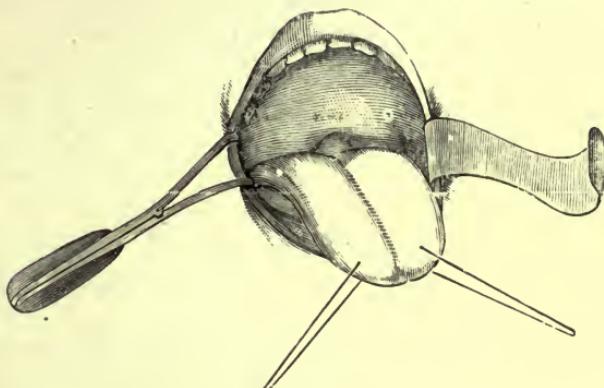


Fig. 34.—MOUTH OPENED BY GAG, CHEEK RETRACTED, AND TONGUE DRAWN OUT.

when partly raised, on a suitable level for the manipulations. A modern dental chair is also of service.

Light.—Daylight from a window in front of and above the level of the patient is best of all, for shadows are avoided. Failing this, a bell-shaped electric hand-lamp may be directed by an assistant towards the mouth, or a forehead mirror and reflected light used when the day is dark.

Gag.—The object of a gag is to keep the mouth widely open. One not liable to shift, to retract, without pinching the cheek, which does not obstruct the light or the surgeon's manipulations, or damage the teeth or gums of the patient, is necessary. There are many forms and modifications used by surgeons and anaesthetists. The outline of a generally used form is shown in Fig. 34. It is called by instrument makers in this country Coleman's, or Mason's, or Fergusson's gag. It is now generally made entirely of metal, so that

it can be sterilised. We have had a very large gag made in this shape for edentulous patients and for those who are restless under anaesthetics.

Cheek Retractor.—A cheek retractor is used, similar to the one shown in Fig. 34.

Sponges.—Small marine sponges, “button sponges,” or pieces cut from a close-textured sponge, about one inch in diameter, are best. Marine sponges bring out ropy mucus better than anything else; they are specially prepared and rendered aseptic, and should be burnt after use.

Sponge Forceps.—Six sponge forceps, closing to hold the sponge firmly, yet easily unlocked, are required.

Curved Needles on Handles.—Two are prepared, having points like the larger-sized Hagedorn’s needles, by threading them each with a stout silk ligature a foot long.

Scissors.—Two pairs of blunt-topped scissors are used for cutting, one pair straight, the other with the blades curved a little on the flat. They should be stout enough not to yield at their points when cutting through the tongue, yet without being clumsy.

Knives.—A straight-bladed finger knife and an ordinary scalpel. They may be required for dividing the surface of the dorsum along the middle line, for making a V-shaped incision, for outlining the growth, possibly for making a tracheotomy incision.

Clamp Forceps.—Six pairs of ordinary clamp forceps are required, one or two may have the jaw bent at an obtuse angle. It is contemplated in this operation that the disease can be brought out of the mouth at least up to the line of the incisor teeth, and if not, the case is seldom suitable for operating through the mouth only. Hence, there is no use for larger sorts of clamp forceps, nor should there be an occasion for putting them on within the mouth, where they obstruct the light, the surgeon’s manipulations, the patient’s breathing, and are difficult to tie over.

Ligatures.—We sometimes use catgut; but for the last two or three years have generally used silk prepared by boiling; No. 1 for the larger vessels, No. 00 for the fine vessels.

Whilst the above are essential, the following should be at hand:—

Volsella and Tongue Forceps.—It is much better, and injures the healthy part of the tongue much less, to draw out the tongue by silk ligatures. But a volsella may be used to seize the growth, yet its points set up haemorrhage; tongue forceps are apt to slip or to bruise the healthy part of the tongue.

Tracheotomy tube with tapes, trachea dilator, a pair of small double hooks, a blunt hook, and a sharp hook. The tube is the double obtuse-angled one called Parker's, Trendelenburg's sponge cannula being unnecessary as the pharynx is guarded below by a sponge.

The above instruments, being previously clean, may be laid in carbolic acid, 5 per cent., for ten minutes, then swilled with boiled water, and placed on a clean towel, or they may be sterilised instead of being put into the carbolic tray. Instead of being used dry, they may be laid on a tray in water, or in boracic or soda lotion.

(c) *Assistance.*—The surgeon requires the aid of an anaesthetist, and at least one, preferably two, colleagues, also of one nurse. If there is only one assistant besides the anaesthetist, the latter may take charge of the head and the gag, and help with the sponging. If there are two, the second one can do this, leaving the anaesthetist free for emergencies. The first assistant holds out the healthy half of the tongue, or retracts the cheek on his side, whilst with the other hand he is ready to put a sponge on a bleeding point, or to wipe out mucus and blood.

(d) *Position of the Patient.*—We attach great importance to this matter. Formerly, we were in the habit of placing the patient in the position advocated by Whitehead—in a semi-sitting position, with the head held by an assistant in such a manner that it is about on a level with the axilla of the surgeon. But during the last two years, owing to the advantage which we found in the lateral position in operating on patients with adenoid vegetations, we have been employing that position in almost every case of removal of the tongue. The patient is placed on his side, with the head a little forward and downward, so that the blood runs naturally into the cheek and out of the mouth. The surgeon may sit in front of the patient. We are very much impressed

with the advantage of the lateral position in the more severe cases, where it is necessary to remove the tongue very far back, or to take out a thick piece of the floor of the mouth, or to deal with the tonsillar region in addition to the tongue.

(e) *Anæsthesia*.—A general anæsthetic is always used. Of course, small papillomata, etc., may be removed under cocaine, with the patient in a chair, as in minor nose and throat operations. But for all cases where anything serious is in question, a general anæsthetic is required. The anæsthetic used is chloroform, but in most cases it is well to commence with nitrous oxide gas followed by ether. The patient is got under quickly, the mouth is well opened, the gag put into position, and the ligatures passed through the tongue. Then chloroform is blown in by the nostril or corner of the mouth through a soft metal tube connected with Junker's apparatus.*

The Operation.—The mouth is widely opened (Fig. 34) by the gag, and the tongue is drawn out by means of the stout threads passed through the forepart on either side.

* A preliminary tracheotomy would render many of these operations much more easy to perform, but the objections to it have, to my mind, more than counterbalanced its advantages. The operation itself is often associated with a good deal of haemorrhage: the wound may do badly, and give more trouble than the wound in the mouth; the patient finds it difficult to clear the upper air-passage of discharges. I have, therefore, seldom performed tracheotomy as a preliminary to the removal of the tongue, even when the operation in the mouth was likely to be severe.

At a meeting of the Laryngological Society of London at the end of 1899, during a discussion on the treatment of a very large naso-pharyngeal growth, Dr. James W. Bond suggested a preliminary *laryngotomy*, and said that he had practised it in several similar cases; for the operation itself was quite trivial and performed in two or three minutes. A sponge could be pressed into the lower part of the pharynx, so that the operation could be performed without the least fear of blood entering the air-passages; while the wound healed in two or three days.

I was very much struck with the force of this suggestion, and determined to apply it in all large operations at the back of the throat, or, indeed, in the interior of the mouth, in which there is a likelihood of free haemorrhage. I have since done so in two cases of removal of half the tongue, in one case of very large removal of the upper jaw and surrounding parts, and in one case of extensive operation for naso-pharyngeal cancer. The results have, thus far, quite reached my expectation, and I intend to give the operation a very extended trial.—H. T. B.

(f) *V-shaped Incision*.—For small tumours and ulcers, and especially when situated on the anterior third of the tongue, also for removing the superfluous portion of the tongue in macroglossia, a **V**-shaped incision is made either with scissors or a knife in such a manner that, after removal, the edges may be sutured together; in such cases no vessels may require to be tied. When the edges are drawn together haemorrhage ceases, or bleeding points are tied, then interrupted sutures of horsehair are inserted by cleft-palate needles and tightened. It is especially important to treat a tuberculous nodule in this way, so as to obtain primary union and avoid reinfection by bacilli in the sputa.

(g) *Unilateral Excision, Partial or Complete*.—The surgeon draws on one ligature and his assistant the other, and the tongue being thus held straight the surgeon makes an incision with the finger-knife through the mucous membrane of the dorsum, exactly in the middle line from a point well behind the level of the disease forwards to the tip. The mucous membrane beneath the tip is divided in a similar manner. Then with a finger of either hand the tongue can be split back along its raphé so as to avoid wounding the linguals of either side. A cut is made through the mucous membrane in the floor of the mouth, generally close to the jaw, and the cut is carried back behind the disease, generally by splitting the mucous membrane with the finger. Then the surgeon draws the diseased half forwards and upwards, making the geniohyoglossus muscle tense, and cuts through the muscle with scissors close to the genial tubercle. This may bring the surgeon to the anterior pillar of the fauces, which must also be cut through when the entire half has to be cut away.

The affected half of the tongue should now have been so freed from its connections with the floor of the mouth that it can be drawn well out into view beyond the line of the teeth, and this should have taken place without any blood-vessel of importance having been injured. The affected half is now removed rapidly by making short cuts with the scissors through the muscles attached to its base. The

operation is, of course, performed from below upwards. The main vessel can usually be clamped before it is cut through. It lies near the middle line, and appears like a bluish-white cord in the midst of the muscles. The tongue can then be cut away quickly, the dorsal artery requiring to be clamped at the outer and upper angle. (Figs. 5 and 6, pp. 17, 18.)

(h) *Bilateral Excision.*—The tongue is drawn out of the mouth and upwards by the two stout ligatures, as in excision of one-half. The mucous membrane of the floor of the mouth is dealt with in the same manner, but on both sides. The anterior half-arches are divided if the disease extends far back. The tongue is raised up, so that the muscles attached to the base are made tense, and they are rapidly cut across with scissors until the entire tongue is separated on the plane of the inferior border of the lower jaw, as far back as the epiglottis; or, if the disease is not very far back, to a point three-quarters of an inch behind the apparent margin of the cancer.

The arteries are distinguished before they are divided, and are seized with clamp-forceps, so that the bleeding is reduced to a minimum. Just before the tongue is separated a ligature is passed through the tissues of the stump—through the glosso-epiglottidean fold, if the entire tongue is removed—as a means of drawing forward the floor of the mouth if there should be haemorrhage. This ligature may generally with safety be removed on the day following the operation. Until then it not only serves in cases of haemorrhage, but also to prevent the stump from falling back on the larynx.

The operation, as described, is the operation of Whitehead, and we prefer it to any other for the removal of the tongue within the mouth. Instead of removing the tongue in one piece, however, we generally split it, especially if it is of very large size. It is usually easier to remove it in two halves, and the haemorrhage from the splitting is trivial. Mr. Whitehead was, and, we imagine, still is, in the habit of twisting the arteries. We prefer to place a ligature around them.

If, by a mistake, the vessels are not clamped before they are cut, the blood spurts out with considerable force

as the division is made. But the stream is out of the mouth, and the bleeding vessel can be secured in a moment. The vessels should always be permanently secured by twisting or tying before the tongue is completely separated. Indeed, the sooner they are dealt with after they have been clamped the better. The clamps are apt to become loosened and fall off, or to tear away from the soft tissues, if pressure be made on them, or if the patient should struggle. And it must be borne in mind that during large operations on the tongue it is by no means uncommon for a patient to come partly out of the anaesthesia from time to time.

If by any accident the tongue should be separated, either in whole or part, before the stump is controlled by ligature, or before the vessels are secured—a very awkward accident, and one which ought not to take place—Mr. Christopher Heath's recommendation must be borne in mind. The stump is drawn forcibly forwards by the forefinger hooked around it, and the bleeding is thus temporarily arrested. When the blood has been sponged out of the mouth the vessels can be taken up and tied.

(i) *The Dressing of the Stump.*—After drying the surface of the wound, Whitehead swabs it over with a varnish made by substituting for the spirit ordinarily used in the preparation of Friar's balsam a saturated solution of iodoform, made by dissolving it in ether mixed with one volume in ten of turpentine. We more commonly employ powdered iodoform, or pack the surface of the wound with strips of the softest iodoform gauze, which, like the iodoform varnish, has the effect of rapidly stilling the oozing of blood.

When the entire tongue has been removed, or half the tongue and a large part of the floor of the mouth on the same side, the wound is left open, and the foregoing methods are adopted. But when the disease is situated quite on the border or on the dorsum of the tongue, and does not penetrate deeply into the muscular substance, the operation may be modified in such a manner as to leave the mucous membrane of the floor of the mouth, and even that on the under surface of the front and side of the tongue. The incision through the membrane is made as far as is deemed

expedient from the jaw, and the mucous membrane and submucous tissues are separated from the parts beneath, which are cut across in the manner which has been described.

The edges of the mucous membrane of the tongue and floor of the mouth may be united with sutures after the tongue has been removed, and the upper surface may be joined by sutures to the lower surface of the tip and forepart of the wound, so that little or no open wound remains. We are not very favourable to any attempt to close the wound completely, but frequently close part of it, especially the forepart, by attaching the mucous membrane of the dorsum to that of the under surface. The patient is much relieved by even the partial closure of the wound, and swallowing is generally effected with less pain and difficulty. In closure of the back part of the wound, there is always the fear that a cavity will remain beneath the joined mucous membrane, and that blood may collect there and decompose, or that haemorrhage may take place into the cavity. We therefore seldom deal with this part of the wound.

In case of troublesome oozing, however, where there is no vessel which can be tied with advantage, the oozing surface of the wound may be covered with gauze, and the gauze may be fixed in place by means of one or more silk sutures. This forms an effective hindrance to further loss of blood.

The gag is now removed, and if there is a ligature through the stump, it is fixed loosely upon the cheek by a strip of strapping.

(j) The patient is put to bed, lying on one side, with the head low, so that all the mucus escapes by the angle of the mouth on to a piece of wool and gauze or folded rough towel. If the patient lies in this position, there is little difficulty in keeping the mouth free from the collection of discharge, mucus, and saliva. If these materials cling to the interior of the mouth, and the patient is not able to get rid of them, the nurse gently wipes them out from the inside of the cheek with a small lump of sublimate wool on a pair of forceps, taking care to keep clear of the wound, and not to thrust the sponge into the pharynx. We generally

allow the patient to keep little pieces of ice in the mouth during the first day or two, and, if the pain is severe, as it often is, to have a quarter-grain morphia suppository. During the first twenty-four hours, food, if necessary, is administered by means of nutrient enemata. About three ounces of milk and beef-tea or strong beef-extract are given every four hours, with half-an-ounce of brandy, if stimulant is indicated, and, with that, ten minims of liquor opii, if the patient is very restless and suffers severely from pain.

On the day following the operation, iodoform may be insufflated on the raw surface morning and evening, the mouth may be washed out with permanganate solution, and the gauze packing may be removed. But this is often left for forty-eight hours, or even for three days, when it comes away much more readily. As a rule, the patient can swallow on the second day, taking food from a feeder with a piece of india-rubber tubing on the spout. He lies on the sound side, and places the tubing on that side of the tongue, if only half of the tongue has been removed. In cases in which the operation has been very extensive, it may be necessary to feed through a tube and funnel. A soft catheter, one of the black bulbous or a vulcanised india-rubber, about No. 6 or 7 English, may be used for the purpose. It is fastened to a long piece of india-rubber tubing, to the other end of which is fixed a glass funnel. The catheter is smeared with oil or glycerine, and is introduced through the mouth or nose.

A little water should be allowed to run down it first to be sure that there is no obstruction, and that none of the food is likely to make its way into the larynx and air-passages. The catheter need not be passed more than half-way down the œsophagus. This feeding may be performed twice or three times in twenty-four hours, a pint or a pint and a half being administered on each occasion. The milk or beef-tea, or other liquid which is given, should not too quickly run into the stomach. The rate at which it runs can be easily regulated by raising or lowering the funnel, and the flow can be instantly stopped in case of need (regurgitation or cough) by lowering the funnel to a lower level than the patient's mouth. After the nourishing

liquid has been introduced, a little water is sent down into the stomach to clear the tube and catheter. The tube is raised and straightened in order to completely empty it; it is then tightly pinched between the finger and thumb, and the catheter is withdrawn. By this means not a drop of liquid will find its way into the air-passages.

Tube-feeding is generally preceded by a little cocaine sprayed on the back of the throat, and the patient is propped up, or in the sitting posture. After the method has been established in the individual case, the catheter can be readily passed by a well-trained and intelligent nurse, so that, in case of need, the food can be administered by her at regular intervals. The patient will often himself regulate the rate of flow and assist in the removal of the catheter. It is scarcely necessary to suggest that the apparatus must be thoroughly cleansed after every time of use.

2. The Submaxillary, Extra-buccal, often called Kocher's Operation.—All that has been described in the foregoing part of the chapter upon excision through the mouth applies to the more extensive operations now to be detailed. Hence there is no need to repeat what has been already said, only to relate the additional measures connected with these operations. The various modifications are numerous, and there are several ways employed in reaching the same end. Recalling what was said at the end of the last chapter about the use of the name "Kocher," the special peculiarities of Professor Kocher's operation, as described in his original paper and in the last edition of his "Operative Surgery," we will now describe what may be called a typical operation for a favourable and early case—viz. an excision of the lymphatic glands in the neck, whether these can be felt to be enlarged beforehand or not, along with the growth in the mouth, whilst preserving the floor of the mouth and other important structures. Then an account will be given of each of the chief further modifications required according to the position and extent of the primary growth or of the secondary glandular implications. The indications for the various operations are given later on.

The operation described by Kocher in 1880 included a

preliminary tracheotomy and the ligature of the lingual artery on one or both sides, as well as the facial artery.

Tracheotomy was performed and an ordinary cannula employed, Trendelenburg's cannula, which sometimes produces serious dyspnœa when it is inflated, not being necessary, on account of other precautions which were taken during and after the operation. The pharynx was completely filled by a sponge soaked in carbolic acid and attached to a string, by means of which it could be easily removed when necessary. The first incision (Fig. 35) was made along the anterior border of the sterno-mastoid muscle, commencing a little below the tip of the ear. From the first, a second incision was made from the middle of the sterno-mastoid muscle to the hyoid bone, and along the anterior border of the digastric to the jaw. The flap was turned up on the cheek, and the facial artery and vein and the lingual artery were tied. The submaxillary fossa was then completely cleared out, commencing from behind; the lymphatic glands were removed, and even the submaxillary and sublingual salivary glands, if the disease appeared to lie so near as to affect them. The mucous membrane was now divided along the lower jaw, and as much as was necessary of the mylo-hyoid muscle was separated from the bone. The tongue was drawn down through the opening, exposed with great ease, and removed either in part or whole with scissors or the galvano-cautery. The galvano-cautery was preferred by Kocher on account of the less liability of oozing after it had been employed. If the whole tongue was removed, the lingual artery of the side opposite to the operation was ligatured through a separate incision.

Kocher laid great stress on the after-treatment, and on the treatment of the wound within the mouth. If the operation was extensive, the external wound was not to be closed with sutures. The two great dangers of general sepsis and pneumonia from swallowing various matters were to be avoided by the following measures. The tracheotomy cannula was left in and allowed to lie loose in the trachea, as usual after tracheotomy. In order that the wound should not in the slightest measure be infiltrated by the discharges, the skin flaps were fixed back with sutures, and the entire

cavity, from the entrance of the wound right back into the mouth and pharynx, was plugged with a tampon of sponge or gauze soaked in a solution of carbolic acid, 5 per cent. But before so strong a solution of carbolic acid was applied directly to the mucous membrane of the mouth, the tampon was just washed over with water. The sponge, or gauze, lay immediately on the epiglottis and root of the tongue, and filled the bottom of the wound as far as it is covered with mucous membrane. The naso-pharynx was treated in the same way as part of the general wound, only taking care to protect the mucous membrane from the acid as in the mouth. The whole operation was performed under the carbolic spray. The patient was fed partly by the rectum, but the feeding was accomplished chiefly when the dressings were changed. This was done twice a day; and before the fresh dressing was applied, nourishment was given through a tube introduced for the purpose into the stomach.

The reason for particularly describing Professor Kocher's operation, is that it was the first, and perhaps the only, attempt which has been made to carry out the Listerian methods of antisepsis in operations for the removal of the tongue. This, which was the essential point in the operation, has been generally overlooked, and the name of Kocher has been applied to the mere incision, the removal of the contents of the submaxillary triangle, and the taking out of the tongue, or of half of the tongue, through the opening in the neck. We do not know how far the antiseptic method is carried out at the present time, but the results which we have to show in this country lead us to believe that the following principles may safely be adopted in the treatment of the more or less complicated conditions which are met with in connection with cancer of the tongue.

(a) *Cancer of the Tongue, with or without actual Enlargement of the Lymphatic Glands.*—If the disease does not affect the floor of the mouth, and is limited to one-half of the tongue, or even if the floor of the mouth is affected, but not deeply, and it is decided to remove the glands, whether they are apparently diseased or not, we are quite sure the safest plan is to remove the tongue, or as much of it as may be necessary, first, and there is in such cases no

reason to prefer the submaxillary to the buccal operation. If the disease of the tongue is very extensive, or the tongue is of very large size, the cheek may be incised in the manner and to the extent shown in Fig. 35. But this is very rarely necessary when the operator is experienced in the removal of the tongue within the mouth. On the other hand, it may quite properly be adopted by young operators, and in cases in which the disease has extended from the tongue up into the tonsillar region, if the case is considered to be within the reach of operation.

When the patient has completely recovered from the operation on the tongue, and can take food well—which is generally in the course of three or four weeks—the operation for the removal of the glands may be undertaken with almost certain safety. For this purpose, we prefer the incision shown in Fig. 35, because it passes much farther down the neck than the incisions generally described. The skin is prepared in the manner usually employed at the present time, and the preparation should be made on the night previous to the operation, and be maintained until the moment of the operation. All the preparation of the patient is such as is usual before a considerable operation, and the instruments are such as are commonly employed for a large dissection. It must be borne in mind that about twenty clamp-forceps will be needed. The best ligatures—and an abundant supply must be prepared—are either of fine catgut or of very fine silk, No. 00, which should be boiled for a quarter of an hour or twenty minutes before it is used.

The shoulders are raised on a pillow, the head is thrown back and the face turned well towards the sound side. Ether is generally administered at first, but as the operation occupies a long time, it is well to follow on with chloroform. The first incision (Fig. 35) is made along the anterior border of the sterno-mastoid muscle, and is six to eight inches long; it passes down to the muscle, and the vessels are clamped on both sides as they are cut through. The second incision commences immediately below the symphysis of the jaw, and joins the first incision almost at a right angle, about the thyroid cartilage. These two incisions map out two

triangular flaps; an anterior, with the apex looking backwards; a superior, with the apex looking downwards. The two flaps are turned back in such a manner as to expose the whole of the great anterior triangle of the neck. It must be borne in mind that the object of the operation is to remove (Fig. 7, p. 22) the submental, the submaxillary, the carotid, and the parotid



Fig. 35.—LINES FOR THE INCISIONS IN THE NECK, ALSO FOR THE DIVISION OF THE CHEEK.

In the neck the dotted lines represent the incisions of the original operation by Kocher. The unbroken lines represent the incisions now used as described in the text (p. 381). The dotted line on the face represents where the cheek should be split.

(superior carotid) lymphatic glands, and to do so with all the surrounding tissues, including the submaxillary salivary gland, perhaps also the sublingual gland, and often a part of the parotid salivary gland. The dissection is best begun at the apex of the triangle. The fascia and connective tissues are dissected off the muscles in front and the sterno-mastoid muscle behind, and off the sheath of the carotid artery and jugular vein. It is very important to thoroughly expose the carotid sheath, for over the bulbous dilatation at the division of the common carotid there is almost always a large gland, diseased, if the glands are actually affected. And below this gland there are often one or more smaller glands, of the same chain, which should be removed, and

which will only be removed if the dissection is carried down to the vessels at the very apex of the triangle. The vessels which need division may, many of them, be clamped, tied in two places and divided without being previously cut. But it is not always possible to avoid wounding them, especially the veins, which are very thin-walled, and are apt to be mistaken for fascia. The operation should be performed deliberately. Nothing is gained by hurry, either in regard to the removal of the disease or to the prevention of haemorrhage; indeed, with the greatest care, there will be a considerable loss of blood. The facial artery is taken up on the under and back aspect of the salivary gland, as this is raised up from its bed; but it is necessary to tie it again as it passes on to the border of the maxilla, and with it the facial vein, which bleeds very freely. If the primary cancer is seated far back on the tongue, the submental glands will not be likely to be affected; but if it is farther forward, they should be removed. They are often troublesome to find, but if the dissection clears away all the tissues between the skin and the muscles, and again between the muscles, they will be found in these tissues. Again, the parotid group of carotid glands is troublesome to deal with; but by carrying the dissection up along the great vessels, and also behind them, the chain of glands will be cleared out. During the later stages of the dissection, when the submaxillary salivary gland and the parotid lymphatic glands are being removed, it is well to tampon the lower part of the wound which is now finished with; and for this purpose iodoform gauze is the best material. A great deal of unnecessary oozing of blood may thus be prevented. The operation occupies about an hour and a quarter, and the muscles of the anterior triangle, including those of the submaxillary triangle, are left quite bare. It is well to tie Wharton's duct, as a preventive to the possible infection of the wound from the mouth.

This operation is usually rapidly recovered from; and this in spite of the fact that the wound often becomes infected from the mouth, even when there is no obvious communication between the two. It is therefore proper to ensure drainage by means of a tube for the first three or four days, and later by a strip of gutta-percha tissue. The

hollow left by the removal of the salivary gland is at first unsightly, because it throws the lower jaw-bone into relief as compared with the bone of the other side; but this mends in the course of time. It must be remembered that this is a very severe operation, and when it is combined with a serious operation for the removal of a large part of the tongue, is likely to try the strength of the patient, even to death. For this reason it should be performed on a separate occasion.

Two objections may be made to the division of the operation into two parts—that the tissues between the primary disease and the lymphatic glands are not removed in one continuous mass with the primary disease and the glands, as they are in the modern operations for cancer of the breast; and that the patient is subjected to the mental distress of a second severe operation on the recovery from the first operation. The first objection would be very serious if the anatomical relations between primary epithelioma of the tongue and the lymphatic glands were similar to those between spheroidal-celled carcinoma of the breast and the lymphatic glands in the axilla. But there are very good reasons for believing that they are not similar, and that the intervening lymphatic vessels are not infected or full of the cancer, and that it is therefore not necessary to remove them. The second objection must not be allowed to weigh against the thoroughness of the operation and the small danger to life when it is divided into two parts.

This removal of the contents of the anterior triangle should be employed as a routine operation in all cases of squamous-celled carcinoma of the tongue, even when there is no obvious enlargement of the lymphatic glands. The difficulty is to decide what should be done in those cases in which the disease has crossed the middle line of the tongue, or is close upon it. Also, the comparatively rare cases in which the glands of both sides of the tongue are affected by a primary cancer which is quite limited to one border of the tongue. In all cases the best rule will probably be to remove the glands on the side corresponding with the side of the tongue on which the primary disease commenced. The patient should be under careful supervision for many

months afterwards, and the glands on the other side of the neck should be removed the moment any one of them is observed to be enlarged. Complete removal of the contents of the anterior triangle on both sides of the neck is a very severe procedure, and would gravely try the strength of any but the strongest patient. On the other hand, it would be very difficult to persuade a patient to undergo three operations, one or two of which would certainly appear unnecessary to him.

(b) *Cancer of the Tongue affecting the Floor of the Mouth on the same Side, and involving a Portion of the Lower Jaw.*—Such cases, which are very unfavourable so far as cure is concerned, may be well dealt with by Von Langenbeck's operation, which appears to be largely employed on the Continent. A very free incision is made vertically along the side of the neck, up over the lower jaw, about the level of the last molar tooth, where the jaw is divided, and the two portions are turned back. The incision will, of course, depend on the part of the jaw which is involved, but the level of the last molar tooth is the usual situation of one of the incisions through it. The affected portion of the jaw is separated in front and behind by sawing. The sound portions of the jaw are turned outwards, and the soft parts are separated from them as far as may be necessary for the complete removal of the disease in the mouth. The glands which correspond with the disease are removed; but as in most cases all the four groups of glands which were mentioned in the last operation are liable to be affected, the operation for their removal should be as large as that which has been described. For this purpose the original incision of Von Langenbeck needs to be supplemented.

Such an operation as this is very dangerous to life. If it can be divided into two parts, consistently with the complete removal of the disease and of the contents of the anterior triangle, this is the wisest course to pursue. If this is not possible, the dissection should be commenced from below at the apex of the triangle, and all the vessels should be carefully and deliberately ligatured before the tongue is attacked, although the division of the jaw and the turning

back of the sound parts is desirable before the contents of the submaxillary triangle are removed. This part of the operation is thus rendered easier and more free from haemorrhage, especially if the external carotid artery is ligatured. Under these circumstances the removal of the affected portion of the tongue is singularly easy and bloodless.

(c) *Cancer of the Floor of the Mouth in Front, with more or less Implication of the Muscular Substance of the Tongue.*—In those cases in which the disease is of small extent, and is not deeply fixed, it can be removed with scissors, together with a wide area of the surrounding tissues, two-thirds or three-quarters of an inch in every direction. There is no need to perform a complicated operation. The haemorrhage may be arrested by filling the cavity, as the disease is cut out, with iodoform gauze. The vessels which are divided are of small size, and may be ligatured after removal of the mass. But if there is great difficulty in applying ligatures in the deep wound, it may be tamponed with gauze, which may be kept in place by means of a couple of stout silk sutures. The plug may be removed at the end of a couple of days, and may be replaced, or the cavity may be kept dusted with iodoform or with orthoform and borax in equal parts.

In such cases the glands in the submental, submaxillary, and lower carotid regions (over the bifurcation of the common carotid) should be removed by a separate operation. If the disease is situated at or close to the middle line of the floor of the mouth, the tissues underneath and between the muscles of the floor of the mouth may be removed by Regnoli's incision (Fig. 33); and if the glandular disease appears to be more widely spread, the ends of the incision can be carried back in order to allow of the removal of the contents of the submaxillary triangle on both sides.

When the primary disease is much more extensive, and passes deeply down into the muscles forming the floor of the mouth, and when it passes some distance back on either side of the middle line, and infiltrates the under aspect of the tongue, it can only be removed by a large

and dangerous operation. The glands will certainly be affected; whether obviously affected or not, they should be removed, for the operation for the removal of the primary disease can only be effectually performed through a considerable external incision. The best incision for the purpose is from the symphysis of the jaw down to the middle of the body of the hyoid bone, thence across the neck down to the level of the thyroid cartilage (as shown in Fig. 35, the anterior lines of Kocher's incision), and downwards for a short distance along the line of the common carotid. A similar lateral incision is made on the other side from the body of the hyoid bone. The flaps are turned back so as to thoroughly expose the structures beneath. The contents of the submaxillary region and the carotid group of glands are first removed on one side, and the lingual artery is tied where it comes off from the external carotid. The same dissection is then performed on the other side. The muscles which attach the hyoid bone to the lower jaw are divided by a curved incision in the line of the lower jaw, and the disease is separated from the bone in front with the finger passed up from below. The tongue is drawn down through the opening so as to lie, with all the disease of the floor of the mouth, outside the mouth; it completely fills the opening, so that no blood passes into the mouth. The disease, and as much of the forepart and under surface of the tongue as is deemed desirable, can be very freely cut away with scissors, and the vessels can be deliberately taken up and tied. If the cancer has involved the inner aspect of the lower jaw, the affected portion of bone can be removed with a small saw or chisel and large cutting forceps; or the inner aspect of the bone can be cut away with chisel and mallet. But it is very desirable to maintain the line of the jaw intact, if this can be done consistently with the free removal of the disease.

The operation, as it is thus described, is not at all difficult, and the bleeding from the floor of the mouth and tongue is external and absolutely under control. But the operation is only a small part of the difficulty of the case. If the disease has necessitated the division and

removal of the muscles on both sides of the floor of the mouth the bearings of the larynx are cut through, and the larynx sinks down with the threat of instant suffocation. The peril may, however, readily be averted by drawing the tongue forward by stout threads passed through the forepart just behind the line of incision. It is then necessary to provide against suffocation from the sinking down of the larynx until the wound is in fair way of healing—for a period of ten days to a fortnight. This may be done by fastening the remains of the muscles to the fragments of tissues at the back of the jaw. But as the wound will certainly be septic for many days after the operation, there is always danger that the sutures may suddenly give way, and instant suffocation may ensue. In these operations, we believe the safest course is to perform tracheotomy, and to continue the use of the tube until all danger of suffocation has passed away. These appear to us to be the only conditions in which tracheotomy is necessary in operations on the tongue.* The additional operation is very undesirable, and should only be performed under absolute necessity. The air-passages are apt to be poisoned by discharges entering them from the wound of the mouth through the tracheotomy wound, and the patient finds it much more difficult to cough up discharges from the air-passages after the performance of tracheotomy.

If the muscles can be preserved on one side, or if even a part of them can be preserved on both sides, security against the sinking down of the larynx will be afforded, and the tracheotomy will not be needed.

As a good deal of oozing takes place after the removal of the disease, and as the patient has certainly lost a considerable quantity of blood in the course of the long and extensive dissection, it is much safer to fill the wound in the floor of the mouth and beneath the tongue with iodoform gauze, which may either be renewed every day or two, or may be removed at the end of two days, when the wound may be treated with iodoform powder. The external wound will certainly need to be drained, probably

* See note on preliminary *laryngotomy* on page 372.

on both sides, and the drainage must be retained until healing is far advanced. There is no necessity to feed the patient with tube and funnel; he can almost always swallow without difficulty, especially if the cavity in the floor of the mouth is lightly tamponed.

CHAPTER XXI.

QUESTIONS CONNECTED WITH OPERATIONS.

Is it necessary to Remove the entire Tongue in every Instance?—Is it necessary to Remove the Lymphatic Glands in every Instance?—Results of Operations—Deaths due to Operation—Causes of Death—Cures due to Operation—Recurrence after Operation—Palliative Treatment—Division of Lingual Nerve.

In considering the results of operations for cancer of the tongue, the objects and possibilities of the operation must be borne in mind. Although cancer of the tongue may be disseminated in the lungs, liver, and other parts of the body, this may certainly be regarded as a rare event, and, for practical purposes, the disease is limited to the tongue and the glands. Roger Williams says that in 52 post-mortem examinations of patients with cancer of the tongue, there was affection of the glands in 51, while secondary deposits in the liver, lungs, etc., were only found in 7 cases. In some cases, the disease having been successfully removed from the tongue, it never reaches the glands. In deciding the form and extent of an operation, we have to decide several important points: how much of the tongue must be removed in order to ensure freedom from recurrence *in situ*; in what cases it is necessary to remove the lymphatic glands, and what glands should be removed.

How much of the Tongue is it necessary to Remove in each individual case of Cancer?—We believe it may be laid down as a general rule, from which there are comparatively few exceptions, that the operation, to ensure anything like freedom from recurrence *in situ*, must comprise the removal of the disease, together with three-quarters of an inch of apparently healthy tissues around it in every direction. If this cannot be accomplished, the case may still prove to be successful, but the prospect of success is smaller

the nearer the incision passes to the border of the cancer in any direction. The removal of the entire tongue in every case of cancer has been suggested as likely to lead to far better results. The suggestion is without value. In the majority of cancers of the border of the tongue, there is no fear of recurrence in the other half of the tongue, but there is often fear of recurrence on the same side, in the floor of the mouth, or in the tonsillar region. The removal of the entire tongue would do nothing to avert such recurrence. The cancer should be made, as far as possible, the centre of the operation. This question is dealt with in a paper in the *British Medical Journal* of February, 1898 (vol. i., p. 541), "What Operation can do for Cancer of the Tongue" (Butlin), which may be studied by those who are in doubt on the advisability of removing the entire tongue.

Is a routine Operation for the Removal of the Lymphatic Glands necessary or desirable in every case?—Every surgeon who is in the habit of operating for cancer of the tongue is familiar with cases in which the tongue remains free from recurrence of the disease, but the patient dies from affection of the lymphatic glands; probably few surgeons are aware of the great frequency with which this catastrophe occurs. Some idea of it may be gained from the paper which has just been mentioned. One hundred and two patients were operated on; seventeen died of the operation or were lost sight of shortly after recovery; and thirty-nine were well when last seen or heard of, or had died of some other cause (probably, in several of them, cancer). Of the remaining forty-six patients, eighteen were dead or alive with recurrence *in situ*, and no fewer than twenty-eight were dead or alive with affection of the lymphatic glands without recurrence of the disease *in situ*. The knowledge of these and similar statistics leads us to feel very strongly that an attempt should be made to meet the very probable contingency of affection of the glands after removal of cancer of the tongue. In some parts of the body there would be little difficulty in dealing with the question by a routine removal of the glands which are liable to become affected. But the case is not so simple for cancer of the tongue. It has been already pointed out that the glands which are liable to be affected

are widely scattered throughout the whole of the anterior triangle of the neck. They are not even limited to the anterior triangle, for those behind the sterno-mastoid as far down as the lower part of the posterior triangle are in some cases, although rarely, diseased. And, in a certain number of cases, the glands on the other side of the neck, or on both sides, are affected, even when the primary disease is strictly limited to one side.

In spite, however, of these difficulties, and of the impossibility of predicting the course of the disease in the individual case, the indication for active treatment is so urgent that it cannot be denied. We think a general rule may be laid down that, when the primary disease is limited to one-half of the tongue, and can be removed with a sufficient area of healthy tissues around it to practically ensure the patient against recurrence *in situ*, the anterior triangle should be cleared out in the manner described in the last chapter. The operation should be performed as soon as the patient has recovered sufficiently from the operation within the mouth to bear it, and the dissection should in every case be directed to the removal of the submaxillary and carotid groups of glands, while those in the parotid and submental regions should be specially dealt with according to whether the primary disease is seated far back or forward on the tongue. In the case of primary disease seated in the middle of the tongue, which may therefore affect the glands on both sides of the neck if the disease is well towards the front, the removal of the lymphatic glands in the submental, submaxillary, and carotid regions on both sides will probably be necessary to preserve the patient from probable later affection of the glands. With regard to cancers in the middle of the tongue, deep seated in the muscular substance, there seems reason to hope that they are not so likely to affect the lymphatic glands as those which are more superficial. If this be so, it is a very fortunate circumstance, for it would be difficult to remove all the glands which might be liable to be affected in such cases. It is not yet possible to speak decidedly on this point, for these central deep-seated cancers are of rare occurrence.

Results of Operations; Deaths due to Operation.—It is

exceedingly difficult to give anything like a correct idea of the mortality which is likely to follow operations for the removal of cancer of the tongue. The mere removal of a part of the tongue, amounting to at least one-half, is followed by the very smallest mortality. It is quite possible to perform one hundred of such operations with scarcely a death. Even the removal of the entire tongue may be performed with a very small percentage of deaths. But the case is very different when the removal of the primary disease involves the removal of a large part of the floor of the mouth, or the tonsillar region, and part of the pharynx, or resection of some part of the lower jaw. And the large complicated operations which are often performed for the removal of the primary disease and the lymphatic glands are very far more dangerous than those which are limited to the tongue. In 1891 Mr. Whitehead complained that his statistics had not been fairly treated by Mr. Butlin, because the total number of operations which he had performed (and published) had been massed together and the mortality estimated on the whole. Mr. Whitehead thought they ought to have been divided according to the nature and extent of the operation. The authors think that, although at that time it would have been very desirable to separate the different kinds of operation, and estimate the mortality of each in turn, the number of cases was not sufficient to allow this to be done successfully, and that no real injustice was done to Mr. Whitehead by the method which was adopted; for although his success in the uncomplicated removal of the whole or a part of the tongue was exceedingly good (101 cases, with 3 deaths), the mortality of his complicated operations was exceedingly heavy, amounting to 17 deaths in 38 cases, the mortality under one heading alone ("excisions below the jaw") being 7 deaths in 9 cases (*British Medical Journal*, 1891, i. 961). Mr. Whitehead's statistics furnished 139 operations (? patients) with 20 deaths, giving a death-ratio of 14·3 per cent.

The mortality of operations for cancer of the tongue has certainly grown less during the last ten or fifteen years, partly owing to the improved operation for the primary disease (which we owe to Whitehead), partly to the better

management of the patient after the operation. But while the mortality of uncomplicated removal of the whole or part of the tongue has grown smaller and smaller, the general mortality of all operations for cancer of the tongue has not diminished in the same proportion, for the very good reason that surgeons who are frequently operating for cancer of the tongue are no longer content with the operations which would have been deemed sufficient years ago. The tendency is to increase the extent of the operation, both for the primary disease and for the removal of the glands, and to undertake operations for the primary disease which would not have been dreamed of twenty, or even fifteen, years ago. An idea of the relative danger of these operations may be gained from the following table, drawn up from four Clinics: Whitehead, *loc. cit.*, 1891, 139 cases; Kocher, paper by Sachs in *Langenbeck's Archiv*, 1893, xlv. 774, 59 cases; Krönlein, paper by Carl Binder in the *Beiträge z. klin. Chir.*, 1896, xvii. 253, 33 cases; Butlin, *British Medical Journal*, 1898, i. 541, 102 cases. The total number of cases is 333, of various magnitude, with 42 deaths due to the operation—a mortality of rather more than 12½ per cent. Three hundred and eleven of these cases can be fairly classified under the three headings: Uncomplicated removal of part or the whole of the tongue, 202, with 14 deaths; excision below the jaw, or removal of glands and part or whole of tongue, 62, with 13 deaths; division of jaw, 47, with 12 deaths.

The mortality for the uncomplicated operations is scarcely 7 per cent., but it rises to more than 20 per cent. for the excisions below the jaw, and to 25 per cent. for the operations which are complicated by removal of part of the lower jaw. It must, of course, always be taken into account that the large operations are generally necessitated either by extensive disease or badly-placed disease, and are not merely performed at the caprice of the operator. But it is none the less certain that many of them might very well be divided into two parts, with an interval of three or four weeks between the two parts. The diminution of mortality by this means would be very considerable. The desire to finish the operation at a single sitting, and to tie the

lingual artery as a preliminary to the removal of the disease within the mouth, must not be allowed to influence the operator to the prejudice of the patient.

The *causes of death* are much the same as they were formerly—haemorrhage, shock and exhaustion, and sepsis. Abundant haemorrhage and severe shock attendant on the large complicated operations are, even now, not responsible for so many deaths as sepsis; and death from secondary haemorrhage is unusual. Sepsis takes, in the large majority of cases, the form of septic affection of the lungs, septic pneumonia and gangrene, and septic bronchitis. These affections are probably always due to blood which has been drawn into the air-passages at the time of the operation, or to food which has made its way down the trachea during the first attempts at feeding the patient, or to the foul condition of the wound and of the discharges which proceed from it.

In order to combat these various dangers successfully, they and the manner of their occurrence must be constantly borne in mind. The division of the operation into two parts is of enormous importance, and should be practised whenever the conditions of the case will permit it. The danger of haemorrhage and shock is almost completely obviated by this means. If circumstances render the large complicated operations necessary, the dissection of the tissues of the neck should be proceeded with deliberately, and every vessel, so far as possible, should be clamped before it is cut and tied. The lingual artery should be tied close to its origin from the external carotid; and in some cases the external carotid itself may with advantage be ligatured. But it must be remembered that the wound will almost certainly be septic, and that secondary haemorrhage may occur after the ligature of the large arteries. In order to prevent oozing after the completion of the operation, the wound had better be carefully filled with iodoform gauze, which may be removed on the following day. By such means, the first dangers of these severe operations may be lessened, but they are not wholly averted.

The various measures which were recommended in the chapter on the method of performing operations and on the

after-treatment will do much to preserve the patient from septic affections of the lungs. The lateral posture during the operation, with the head low and well forwards; the same posture after the operation, so that the discharges tend to run out of the mouth, and not into the pharynx, and care in the administration of food during the first few days, are the points to which the greatest attention must be paid.

In a few cases, we have tried the injection of anti-streptococcal serum during several days before the operation; and we understand that the same precaution has been taken by one or two surgeons in London. Four injections, each 10 c.cm., may be given.*

Cures due to Operation.—In the last edition of this work really nothing was said on this important subject, perhaps because there was so little that was good to say. That cases of cancer of the tongue were sometimes cured by operation was well known, but the cases in which a full three years had elapsed since the operation without recurrence of the disease within the mouth or affection of the lymphatic glands were singularly few. During the last fifteen years much more attention has been paid to the further history of patients who have been operated on for cancer, and the patients whose tongues have been removed have been followed very carefully in certain clinics. It is, of course, possible to relate instances of patients who have remained free from the disease for several or many years after operation for cancer of the tongue (p. 465). But it is better to take the total experience of several operators than to select a few successful cases. Taking, therefore, the statistics of the same four surgeons (p. 294), there are 199 of the 333 cases which can be used for this purpose. Forty of the 199 patients were either well and free from the disease or had died of some other cause than cancer of the tongue more than three years after the last operation, which gives a percentage

* The number of cases in which this method has been adopted is yet too few to allow a judgment to be formed upon it. It does not seem to be needful in the uncomplicated operations; but it may well be employed in those which are likely to be followed by a badly septic condition of the wound. The cases in which it is employed during the next few years will be observed with the greatest interest.

of twenty cures to one hundred cases of operation. In addition, there were a good many patients who were alive and well from one to three years after the last operation, but who could not be reckoned among the cured cases on the three years' limit, which is generally adopted in estimating the results of operations for cancer. There is every reason to hope that this percentage, which is still very small, will be greatly improved in the future; but there is at the same time every reason to believe that cancer of the tongue will always remain a very deadly disease. The best hope lies in the continued study of pre-cancerous conditions, and in the removal of them before they have actually become cancerous.

As to the cases in which an operation is most likely to be successful, there is no doubt: small cancers of the anterior part of the tongue, away from the middle line and floor of the mouth, not deeply fixed in the muscular substance of the tongue, and not associated with any actual affection of the glands; also, the dry, warty forms of the disease, more flat than bulky, and not quickly growing, seem the least malignant. On the other hand, cancers which are not well defined, and which infiltrate the substance of the tongue, and those which are seated far back, particularly those which involve the anterior half-arch of the palate or the floor of the mouth and impair the mobility of the tongue, are bad cases for operation, worst of all when they are associated with affection of the lymphatic glands.

Cancer of the floor of the mouth has always enjoyed a very bad repute, but we are inclined to think that its deadliness has been exaggerated. Butlin removed a cancer of the floor of the mouth under the front part of the tip of the tongue about thirteen years ago for a gentleman who is still alive and well, and a cancer of the side of the floor of the mouth, with an enlarged gland, for a gentleman about eight years ago. He also has remained free from the disease up to the present time. Spencer has also had a case of more extensive disease of the floor of the mouth, in which operation has been attended by success. Of course, disease in this situation is generally very dangerous, partly—as Spencer suggests, from several cases which have come

under his own observation—because the situation of the disease is such that it may be overlooked until it has attained a considerable development.

Recurrence of the Disease in situ and Operations for Recurrence.—Recurrence of the disease within the mouth may occur at any period, from immediately after the operation until the end of nine or ten months, after which it becomes much more rare. In the very large majority of cases the disease reappears within six months of its removal. If, therefore, the patient is well during a year from the operation, he may be regarded as not likely to suffer from recurrence of the disease *in situ*. There are, of course, instances of late recurrence, as there are of cancer of many other parts of the body (p. 465). But these instances are so great an exception to the general rule that they probably do not number more than about 1 per cent. among the cases of recurrence. They may, therefore, be regarded rather in the light of pathological curiosities than from a practical point of view. And they certainly should not influence the surgeon in deciding on the question of kind and extent of operation, or be made known to the patient as a possibility in his own case after operation.

There are other cases in which there is not an actual recurrence of the disease *in situ*, but in which a part of the tongue which has been left behind and is the seat of chronic superficial glossitis is attacked by cancer in precisely the same manner as the part of the tongue which was removed. These cases resemble those in which two cancers exist on separate and distant points of the same tongue.

Recurrence of the disease in the lymphatic glands, like the first affection of the lymphatic glands, may be deferred for a much longer period than recurrence of the disease *in situ*. Where the anterior triangle has been cleared out, and the submaxillary salivary gland removed, there is seldom a recurrence in the site from which the glands were excised. But glands behind the sterno-mastoid in the posterior triangle of the neck, or those on the other side of the neck, may be affected. A gentleman was treated by operation for a cancer of large extent in the neighbourhood of the foliate papilla. Half the tongue was removed back to the epiglottis,

together with the contents of the anterior triangle of the neck. Somewhat to the surprise of the operator (Butlin), he remained free from recurrence within the mouth until his death, which took place between two and three years later. But nearly two years after the operation, he perceived a swelling in the posterior triangle of the neck, a little above the clavicle. This proved to be a group of cancerous glands. An attempt was made to remove them, but without success. In another case, in which the primary disease was limited to the right border of the tongue, about three-quarters of an inch in front of the anterior half-arch of the palate, and was of small extent and not deeply infiltrating, the half of the tongue and the contents of the anterior triangle of the neck were removed at two operations with perfect success so far as that part was concerned. The operations were performed in February and May of 1897. In the autumn of the same year the patient caught cold on the racecourse, where he had gone to watch one of his horses run. The submaxillary salivary gland on the *left* side swelled up, became painful, and, later, suppurated and appeared to subside. But within a fortnight it swelled up again, and formed a hard mass, fixed to the bone and the surrounding parts. The disease was attacked, but found to be beyond the reach of a successful operation. Other glands became cancerous, and the patient died of exhaustion in the following summer.

As in all other parts of the body, operations for recurrent disease are rarely likely to be so successful as those for the primary disease. In the first place, the mere fact of recurrence often indicates great malignancy. In the second place, the recurrent disease is often for a long time overlooked, on account of the difficulty in deciding between cancer and induration, which naturally takes place after a severe operation on the tongue. The difficulty is enhanced by the muscular resistance offered by the stump of the tongue under examination. In order to overcome this, it may be necessary to investigate the condition of the parts under chloroform. And, even then, it may be difficult to determine whether there is actually recurrence. The reasons for suspecting recurrence are the presence of a tumour and pain. In the former case, there is little difficulty in deciding;

but, when the recurrence is seated far back in the mouth, is infiltrating and not associated with visible enlargement or ulceration, pain is the main symptom which calls for careful examination. It is extraordinary how difficult it may be, in such a case, to determine the presence of recurrent disease. But it may be taken as the result of a long experience in such cases, that the continuance of severe pain almost invariably indicates the return of the disease.

The removal of the disease is made more difficult in such cases by the very want of limitation and definition which made the diagnosis so uncertain. But, in spite of these obstacles, there are a sufficient number of cases on record to show that recurrent disease may be dealt with successfully. Provided, then, the disease appears to be within the reach of free removal, and the conditions are not widely dissimilar from those which are regarded as favourable to removal of primary disease, operation should be resorted to.

In those cases in which there is a fresh outbreak of cancer on an unhealthy portion of a tongue which was only partly removed at the first operation, it is far safer to remove the entire unhealthy area which remains, without reference to the size and extent of the cancer, which may be small and insignificant. The fact of a second outbreak of cancer in such a tongue must be regarded as evidence of a very decided predisposition to the disease, and it may be certainly predicted that any portion of the tongue which is left behind and is the seat of chronic superficial glossitis in any of its varieties, will surely become the seat of cancer.

Operations for the removal of recurrence in the lymphatic glands are very rarely indeed successful, but an occasional happy case proves that they are not absolutely without hope (p. 465).

Palliative Treatment.

Last of all is the important question of palliative treatment of those cases in which it is found impossible to remove the disease, or in which the patient refuses operation, or in which the disease recurs after removal. After all that has been or can be done by operative treatment,

this question, for the present and probably for many years to come, will more frequently require consideration than any other. Whether the carcinoma is untreated, or whether it recurs after operation, both the patient and the doctor will want to know the best way of allaying the pain, of diminishing the salivation, of correcting the fœtor, of assuaging the hunger, and of arresting the hæmorrhage, which are associated with the steady advance of the disease. Fortunately, we are not so helpless in these matters as our fathers were, and although we cannot promise that a patient shall suffer no distress from an advancing and fatal cancer of the tongue, we can do much to alleviate the distress which, without treatment, would be intolerable. Take each of these troubles separately, and consider what means will best relieve it.

(a) The point to bear in mind is that the symptoms to be relieved are partly produced by the malignant disease and its extensions, but they are very greatly aggravated and sometimes almost entirely arise as a result of the septic changes taking place, not only on the surface of the growth in the mouth, but in its deeper parts. By preventing the septic decomposition of the mouth, the extension to the deeper parts may be much hindered and the acuteness of many of the symptoms, pain, salivation, and the danger of hæmorrhage much diminished.

Hence the methods of buccal antisepsis, previously alluded to on p. 367, and especially the details regarding the preparation before operations, form an important item in the palliative treatment. The cleaning of the teeth, the scaling of them, and the clearing out and temporary filling of cavities, and the frequent rinsing of the mouth with permanganate of potash and listerin, etc., is important. Further, the careful painting of the malignant ulceration, say twice a day, with bieyanide of mercury, 1 in 1,000 (alternatively the corresponding chloride or iodide may be employed) will help to diminish the septic processes in the mouth, and reduce the severity of the symptoms. Other antiseptics highly spoken of are: Arsenious acid dissolved in equal parts of alcohol and water, beginning with the strength of 1 to 150 and increasing to 1 in 50; also carbolic acid, pure or in a

five per cent. solution. The application is in every case carefully painted on, and no fluid is allowed to run off.

(b) *Pain* is not in all instances an equally prominent symptom. Some patients suffer very little pain even up to the period of death. But in other cases pain is excessive and almost constant; it is aggravated by every movement, or attempt at movement, of the tongue; it is increased by the taking of food, however soft and well prepared; and it is even heightened by the contact of the washes which are used for the purpose of cleansing the mouth and correcting the foetor. The worst pain is that which shoots up into the ear, due to the connection of the lingual with the chorda tympani, or auriculo-temporal nerve, or the glossopharyngeal with the nerve of Jacobson. It may be much soothed and even completely relieved by various means. Insufflation, such as we have recommended in the treatment of painful tuberculous ulcers of the tongue, and such as has long been practised with the best result in various affections of the larynx, will often afford great relief. A powder composed of three or four grains of borax, one grain of iodoform, and from one-sixth to one-half grain of morphia, is blown directly upon the surface of the ulcer. The precise spot where the pain is most acute should be chosen, and, before the powder is applied, the surface of the sore should be dried as far as it is practicable to dry it by very lightly touching it with a fragment of absorbent wool, or a tiny roll of blotting-paper. The powder may be blown through a plain glass tube, with a diameter of about one-third of an inch, or through one of the nasal or laryngeal insufflators kept by most instrument makers. The quantity of morphia in each powder must be determined by the amount of suffering of the patient, and by the effect of morphia upon him. The insufflation may be repeated several times in the day, if necessary, for it can easily be performed by a non-professional person, and does not need special skill or knowledge. The relief afforded by insufflation is so great in many instances, that it can scarcely be over-estimated.

Instead of insufflation, the powder may be deftly scattered by introducing it on a long narrow spatula. Morphine is the chief remedy, cocaine or atropine may be used with

it. At the present time orthoform is being tried, but we cannot yet speak decidedly on its merits.

But, for deep ulcers and fissures, especially in the floor of the mouth, by far the best treatment is careful packing with strips of the softest iodoform gauze. The ulcer should be carefully cleansed and dried with wool or gauze, then painted with 10 per cent. solution of cocaine, and packed to the bottom with a strip of gauze. The cavity may be completely filled, and the gauze may be changed every day or, in some cases, may be left for three or four days before it is renewed. Nothing appears to relieve pain and salivation, or to enable the patient to take food with such comfort as this packing. The fœtor also ceases rapidly and does not return so long as the cavity is kept filled with gauze.

There is another local treatment which can scarcely be recommended, but which must not be passed over in silence, the application of the actual cautery to the surface of the ulcerated cancer. It has been employed with marked relief in one or two cases of tuberculous ulcer, and may perhaps prove useful in certain cases of carcinoma where the disease is so situated that it cannot be thoroughly removed, and where one point appears to be, above all others, the seat of the pain. It should be employed at a dull red heat so as not to burn too quickly through the tissues and produce haemorrhage, and should be very carefully and thoroughly applied to the painful and tender parts of the surface of the sore after cocainisation.

(c) *Nerve Division*.—Division of the lingual nerve is described in the chapter on neuralgia of the tongue; but inasmuch as lingual neuralgia is rare and lingual cancer is common, division of the lingual nerve is likely to be much more frequently required for cancer than for neuralgia. In the chapter on neuralgia Hilton's and other methods of dividing the nerve are mentioned. Moore's is preferable to Hilton's when the mere division of the nerve is intended, for it implies little more than a single incision. But Hilton's may with advantage be employed if resection of a portion of the nerve is contemplated. The dissection necessary to expose the nerve may be made under chloroform, and a portion about half an inch in length may be removed.

Division of the nerve may be practised in all cases in which the nerve can be reached, and in which the pain and salivation are not relieved by insufflation. Chloroform may be administered, but Moore's operation really does not necessitate chloroform, unless the patient suffers so much from the disease that he cannot bear the slightest touch upon the tongue, and perhaps cannot bear to open the mouth widely enough to allow the division to be made. If chloroform is necessary, it is probably wiser completely to expose the nerve by Hilton's method, and so make quite sure of dividing it, or of resecting a portion of it.

Generally, the administration of opium and morphia play a large part in the later treatment of most fatal cases of carcinoma of the tongue. No special directions are needed in such cases other than those which should be observed in the administration of the same drugs in other painful diseases. As a rule, it will be found easier to administer the medicine as an injection than by the mouth, but preparations of opium may be given with advantage to the majority of patients by the mouth. Two rules may be observed with benefit to the patient in most cases of cancer of the tongue; first, to give narcotics as soon as they are absolutely necessary to obtain sleep at night; second, when narcotics are used, to use them freely enough to keep the patient relieved by them. The second rule is very important, for it is not unusual for practitioners to administer narcotics in small doses, yet to refuse to increase the dose as the symptoms become more acute, and as the patient becomes habituated to the drug. It should be always borne in mind that, in such cases, the measure of the amount given must be, not the exact quantity, but the effect which is produced.

In the later stages the patient may commence to inhale chloroform.

(d) *Salivation*.—The means which have been discussed in the preceding paragraphs are useful against salivation as well as against pain. The insufflation of iodoform particularly has been successfully employed to diminish the salivation. If the quantity of iodoform in the powders (of which the prescription is given above) is not sufficient, there is no objection to increasing it, or the iodoform may

be made to take the place of a part of the borax, so as not to render the powder too bulky. As the odour of iodoform is disagreeable to most persons, especially when it is used in a very concentrated form, it may not be amiss to say that the addition of a drop of attar of roses to each drachm of iodoform suffices almost entirely to conceal it. This suggestion appeared in a number of the *British Medical Journal* in 1884, and has been found useful in several cases in which persons who were advised to employ iodoform as an external application objected to the drug on account of the pungent odour.

In the remarks on the effect of division of the lingual nerve, it was stated that the profuse salivation, as well as the pain of lingual cancer, are relieved by it. Not only is the patient less annoyed by the salivation, but the secretion of saliva is considerably diminished; and the improvement is maintained as long as the relief from pain, in fact until the nerve unites again.

The vapour of creasote, which will be alluded to in the next paragraph, appears to have the effect of diminishing the quantity of saliva, but it is probably inferior to iodoform in this respect.

Atropine, $\frac{1}{200}$ to $\frac{1}{50}$ gr. as a pill or added to the morphia injection, tends to diminish the secretion of saliva.

(e) *Fætor*.—Again, the powder of iodoform will be found one of the most powerful agents in correcting the stench which is so horrible a feature of advanced lingual carcinoma. As in the case of an offensive operation wound in the mouth, so in the case of an ulcerated carcinoma, the application of iodoform will often completely remove the fœtor. There is not, however, the same certainty of correcting the fœtor of an ulcerated carcinoma, for the ulceration is more difficult to reach in all its windings and its fissures, and the effluvium depends partly on the naturally offensive discharge exuded by the foul disease, partly on sloughing of portions of its surface, and partly on the sinking of food into its depths, where it decomposes. It is well, therefore, to order the mouth to be thoroughly washed out with a solution of Condy's fluid, or weak carbolic acid, or some similar disinfecting fluid before the powdered iodoform is applied.

The formula which has been mentioned may be employed with a greater or less proportion of morphia according to the pain which is complained of, and a greater or less proportion of iodoform according to the intensity of the offensive odour.

Various other applications have been recommended to destroy the stench of lingual cancer, but we believe that none is so efficacious as iodoform. Condyl's fluid, carbolic lotion in different strengths, chlorate of potash gargle, myrrh and borax, peroxide of hydrogen, have all been used for this purpose. The vapour of creasote is preferable to most of these, inhaled through an ordinary inhaler, into which is placed a pint of water, two-thirds boiling, with a teaspoonful of the following mixture: creasote, 80 minims; light carbonate of magnesia, 30 grains; water, 1 ounce. The inhalation may be made at frequent intervals during the day.

Spencer speaks very favourably of the bicyanide of mercury paintings, referred to at the commencement of the section. The fissures and the overhung ulcers are exposed by retraction, and gently and repeatedly wiped out with the solution.

(f) *Hunger*.—In by far the larger number of cases of lingual cancer the patient is able to take nourishment by the mouth without any other assistance than is afforded by the careful preparation of the food. In advanced cases none but liquid food can be taken, and, as a rule, cold or lukewarm liquids are preferred. The food should be free from pepper, spices, and irritating substances; and, if solid food is taken, it should be soft meat and jelly, or very carefully mashed or sopped material. If stimulants are taken, they generally require to be largely diluted, on account of the smarting which they excite when taken in a pure or nearly pure condition.

In those cases in which the taking of food by the mouth is the cause of great distress, either on account of the smarting produced by the direct contact of the food with the surface of the sore, or because the taking of food necessitates or excites movement, or attempt at movement, of the tongue, and every attempt at movement is fraught with anguish, the patient may be fed partly by the mouth, chiefly to allay the

thirst, and partly by the rectum. For the latter purpose, nutrient suppositories are highly to be recommended, or nutrient enemata.

As a nutrient enema, either of those described in the footnote* can be strongly recommended. Butlin has fed a patient solely with one of them for as long as four weeks, and during the whole of that period the enema has been borne without producing the slightest distress.

In a certain number of cases it may be more agreeable to the patient to be fed through a tube introduced into the œsophagus, and passed either into the stomach or a part of

* The following recipes for nutrient enemata have been given me by Mr. Berry, to whose ingenuity they are in great part due, and who used them in cases under my care in the wards of St. Bartholomew's Hospital during the time that he was house-surgeon to the hospital.

The first is :

Milk	...	...	...	...	...	half-a-pint.
Beef-essence	...	...	...	...	...	half-a-pint.
Eggs	...	...	...	...	...	three.
Soda bicarb.	...	...	...	...	...	60 grains.

Mix, boil thoroughly, then rub through a fine hair sieve.

Two ounces of the mixture are to be administered with half-a-drachm of Bender's liquor pancreaticus, one drachm of brandy and tincture of opium if it is deemed necessary.

The second is :

Milk	...	...	...	...	...	half-a-pint.
Beef-essence	...	...	...	...	...	half-a-pint.
Eggs	...	...	...	...	...	three.
Soda bicarb.	...	...	...	...	...	60 grains.
Liquor pancreat.	...	...	...	...	...	six drachms.

Mix thoroughly and digest at a temperature under 140° (Fahr.) until the mixture begins to taste slightly bitter (this usually takes about an hour). Then boil the whole for a minute or two to stop further digestion. Add brandy and tincture of opium afterwards if necessary.

The third is much the easiest to make :

Milk	...	...	...	...	...	one ounce
Beef-essence	...	...	...	...	...	one ounce.
Soda bicarb.	...	...	...	...	...	five grains.
Liq. pancreat.	...	...	...	...	...	half-a-drachm.

Mr. Berry, in his comments on these three enemata, says that the chief difficulty in making the first is the rubbing of the material through a sieve, but this is necessary to allow it to pass through an ordinary enema tube. In making the second, care must be taken lest the digestion be carried too far and the material be thus spoilt. . . . On account of the care which is necessary to prevent this catastrophe, this is the most difficult of the three to prepare, but it is certainly the best when it has been successfully made. Eggs are easily given in enemata when the yolk only is used. (H. T. B.)

the way only. Fluids can be easily run through the tube from a funnel attached to it. The tubes best adapted for the purpose are the vulcanised indiarubber catheters, which are so soft that they produce the least possible irritation, and which can nevertheless be passed without difficulty down the oesophagus. The operation is so unirritating and so easily performed that it may be repeated as often as is necessary; or, if the patient has a great objection to the actual passing of the tube, it may be left in the oesophagus with the end projecting from the mouth, as is done in cases of advanced oesophageal cancer with obstruction.

Hæmorrhage.—Although death from hæmorrhage is not a frequent termination of lingual carcinoma, slight, and sometimes severe, haemorrhages are by no means infrequent, especially in the later stages of the disease, and, without proving directly fatal, are certainly indirectly instrumental in causing death earlier than it might otherwise occur. Death from hæmorrhage at a tolerably early period of the disease, in cases in which it is not possible to remove the disease, and in which, therefore, the only prospect is of death, cannot be deplored, for the patient is spared by such a sudden accident from weeks, or perhaps months, of suffering, which may indeed be softened by treatment, but which must always be hard to bear even under the best-directed treatment. Were it not for the distress occasioned to the friends and the fright to the patient at the sight of the blood, one would be tempted to allow the hæmorrhage to take its course in the fervent hope that it would speedily prove fatal.

The bleeding is usually venous or capillary, and the fluid oozes slowly away, sometimes altogether ceasing, and again commencing to run more quickly. In such cases the question of an operation does not arise. All that is necessary can be done by means of styptics or pressure. If the blood runs from a single point on the surface of the ulcer, or from the bottom of a fissure, it may usually be arrested easily by the pressure of a piece of lint or gauze beneath the finger, and the continuance of the pressure for a few minutes, or, it may be half an hour, suffices. The pledget of lint may be soaked in the tincture of the perchloride of iron, or in the solution (liquor) of the subsulphate of iron, or

may be powdered with matico. When the blood oozes from the whole or a large part of the surface of the ulcer it may be treated in the same way by the pressure of medicated lint or gauze; but it is much more difficult to apply the pressure.

When the haemorrhage is distinctly arterial, and proceeds from one of the larger branches of the lingual, or from the lingual artery itself, the advisability of applying a ligature at the usual seat will arise. The operation is, however, very seldom performed. The occasion for it rarely occurs, and when there is so severe a bleeding as to require it, the rapidity with which the blood is lost, and the weakened condition of the patient, usually quickly end in death. Still, there are cases in which time is afforded for the performance of even so tedious and difficult an operation as ligature of the lingual artery, and in which the patient and the friends urgently desire that life shall be prolonged, even if it be only for a few days. Under these circumstances the artery must be tied with as much expedition as is possible.

(g) *Breaking down of Malignant Lymphatic Glands.*—This is prevented as far as possible by combating the septic decomposition in the mouth. Besides this, early inflammation may be temporarily and partially relieved by iodide of potassium and arsenic administered internally, e.g. in Donovan's solution, but this treatment should not be continued long. Locally, frequently renewed hot fomentations with extract of belladonna and glycerine painted on the skin beneath, or a teaspoonful of opium tincture dropped on the fomentation, give some ease. If suppuration threatens, the surgeon does not hasten to incise; still, when the abscesses begin to point it is desirable to let out the pus through a short incision, to avoid the formation of fistulæ at several points. The abscess cavity is gently syringed and wiped out, and a strip of iodoform gauze inserted, which may be frequently changed. A large excavation may form in the neck, and yet haemorrhage is exceedingly rare.

CHAPTER XXII.

NERVOUS AFFECTIONS OF THE TONGUE.

- I.** Disturbances of Sensation—*A.* Disturbance of General Sensation : (a) Anæsthesia : (1) Local Cerebral Lesion ; (2) Lesions of the Fifth Nerve ; (3) Hysterical—(b) Hyperæsthesia, Neuralgia, Glossalgia : (1) Neuropathic ; (2) Diathetic, Dyspeptic, Gouty ; (3) Reflex ; (4) Stretching and Resection of the Lingual Nerve—(c) Paræsthesia, Imaginary Ulceration. *B.* Disturbance of Taste : (a) Agensia ; (b) Hypergeusia ; (c) Parageusia. *C.* Vaso-motor Disturbance. *D.* Disturbance of Muscular Sense.—**II.** Disturbance of Motility : *A.* Paralysis, or Glossoplegia : (a) Nuclear : (1) Apoplectic ; (2) Degenerative—(b) Of the Root : (1) Tuberculous ; (2) Syphilitic ; (3) Traumatic ; (4) Hydatid ; (5) Tumours—(c) Of the Trunk : (1) Traumatic ; (2) Glandular. *B.* Tremor. *C.* Spasm or Cramp : (1) General ; (2) Idiopathic.—**III.** Trophic Disturbances : (1) Peripheral ; (2) Muscular Atrophy ; (3) Muscular Hypertrophy.

In this chapter the nervous affections of the tongue are briefly referred to without trespassing far into a subject more suitably dealt with in works upon the diseases of the nervous system.

The classification employed by Pasquier and Marie in their paper on the nervous semeiology of the tongue is followed.

I. A. (a) **Anæsthesia.**

(1) *Local Cerebral Lesion.*—Anæsthesia is caused by cerebral haemorrhage, cerebral softening, or the growth of a cerebral tumour, which involve afferent tracts and sensory areas, especially the occipital lobe, the posterior third of the internal capsule, the corpora quadrigemina, the cerebral peduncles, or the bulb. The loss of sensation on a part or one side of the tongue may be noticed by the patient or be only discovered by examination. This may involve especially loss of the sense of touch or that of pain or temperature, to which loss of taste may be added. The lingual and facial hemianæsthesia may be “crossed,” i.e.

on the opposite side to that of the limbs; and Brown-Séquard thought that, as in a case of his the lingual hemianæsthesia was on the opposite side to that of the hemianæsthesia of the face, the lingual fibres did not decussate in the bulb at the same level as others contained in the fifth nerve.

(2) *Anæsthesia from a lesion of the fifth nerve* may be intracranial in origin, the root of the nerve being involved in meningitis, caused by syphilis, heat-stroke, etc., or the nerve may be injured by fracture or disease of the bones of the face.

(3) *Hysterical anæsthesia* is a very variable condition. It may occur in the course of an hysterical attack, e.g. the patient suffers from hemianæsthesia, involving more or less completely the half of the body. It may come on suddenly or gradually, attended by itching or pricking sensations.

I. A. (b) **Hyperæsthesia ; Neuralgia ; Glossalgia.**

This is a condition which may vary from over-sensitivity up to the most severe pain.

(1) *Neuropathic*.—This includes the pain caused by the local diseases of the tongue, of which the most marked has been called glossodynbia exfoliativa (p. 109); very painful papillæ will be mentioned. But the pain may be due to inflammation of the sensory nerve ends, without any appreciable lesion of the epithelial surface. No sharp line of distinction can, however, be drawn between the cases described by Kaposi under the name of glossodynbia exfoliativa; also by Degle. Some show hypertrophy of papillæ, so that the condition has been called "papillitis;" but in others, there is the painful spot without any distinct lesion. There is one marked feature of this form of neuralgia, i.e. that it nearly always occurs in middle-aged women, and the different groups may be united under the term "neuropathic."

Painful sensations, or severe neuralgia of the tongue, very commonly accompany xerostomia, as mentioned before (p. 60), which also is nearly always seen in the same class of women. Thus, Hadden described four women, aged thirty-nine, fifty-two, sixty-three, and seventy-four respectively. All had burning

sensations in the tongue, which they described as intolerable ; mainly in the tongue, but extending sometimes to the palate and lips. In two the attacks were especially severe when the patient lay down at night. They were all nervous, excitable individuals who flushed easily, and the pain was intensified by any nervous disturbance. Others, as Bernhardt, have noted such cases. The xerostomia, or dry mouth, accompanying the neuralgia may exist in various degrees, but even if secretion is excited by pilocarpin the pain need not be altered.

(2) *Diathetic*.—Some cases are distinctly dyspeptic in origin, and the symptoms disappear under appropriate treatment. Thus, Thomson describes the case of a woman, aged forty-nine, who for five months had tingling sensations in the tongue as if hot wires were being thrust through, and the tongue, palate, and fauces seemed to burn. The patient could not masticate nor move the tongue freely on account of the pain. The tongue was covered with a white fur, through which the fungiform papillæ projected. After the administration of calomel and podophyllin all the trouble disappeared. There are other diathetic causes for the neuralgia. The pain is often of gouty or arthritic origin, as shown by the relief attending alkaline and hydrotherapeutic treatment. Such cases are in no way different, except for the absence of an evident lesion, from those referred to in Chapter VIII. p. 128. Magitot has also noted such instances. The pain is frequently attributed to a draught, but there seems great doubt whether a rheumatic as distinguished from a gouty origin can be attributed. Dr. Archibald Garrod tells us that he does not know of a case where the tongue has been the seat of pain in an attack of acute rheumatism. Chomel (1839) has been quoted as mentioning in his lectures cases of lingual rheumatism. He simply says that in two cases there were pains at the base of the tongue and in the pharynx, along with acute general pains. But he made no local examination, and there is nothing to prevent one from attributing the symptoms to acute tonsillitis, or a similar inflammation of the fauces or pharynx. Chomel considered the pains rheumatic because the patient had suffered badly from inflammation of joints. Commencing at the time of her first confinement, two days before the pains in the tongue, the patient had, in addition to

pain in the other joints, an attack of pain in the temporo-maxillary articulation. It is possible, from the history of the case, that the pains in the joints were of septic origin, not true rheumatic fever.

It is difficult to know under which heading to describe a class of case which is sufficiently common and uniform in its characters to merit careful consideration, if only from the patient's point of view—*pain in the region of the foliate papilla*. The foliate papilla, as the chapter on the anatomy of the tongue tells, stands on the border of the tongue just where the fold of mucous membrane covering the anterior half-arch joins the mucous membrane of the tongue. It usually escapes observation in a superficial examination, and can generally be thoroughly exposed only by drawing out the tongue, turning it towards the opposite side, retracting the cheek with a spatula, and throwing a good reflected light upon it. In many persons it is of considerable size; sometimes it stands out like a cock's comb, or is many-pointed; and there is often a depression in the middle, or in front of it, which is lined by mucous membrane of a lighter colour than that which covers the papilla, and which is much redder than the surrounding membrane of the tongue. Pain in this region is of by no means an uncommon occurrence, more frequent in women, but frequent enough in men. It is generally of an aching character, sometimes persistent, sometimes intermittent. It continues on and off for weeks or months, or even for years. It is certainly much more common in neurotic persons, and more common in gouty or rheumatic persons, who are also neurotic. But the exciting cause is often very difficult, if not impossible, to find. Naturally, continuous or very frequently recurring pain in one situation of the tongue distresses the patient, and the possibility of cancer occurs, or is suggested by some anxious friend or doctor, particularly as nearly all the patients are of an age to be the subjects of cancer of the tongue. The border of the tongue is carefully examined, and lo! the foliate papilla is discovered, standing out menacingly on the border of the tongue, with its fringe, which suggests a warty growth, and its depression, which is often taken for an ulcer. To cure the ulcer, caustic is applied, and a sore place is produced where no sore place formerly existed. The

discovery of the growth and ulcer is a source of renewed terror to the patient and to many a doctor who is not acquainted with the natural physiognomy of the papilla, and who does not carefully compare the affected border of the tongue with the other border, when the discovery of the corresponding foliate papilla might dispel the illusion of serious disease. The attention of the patient is incessantly directed to the abnormal condition of the tongue, and the fear of cancer is ever before his mind. What wonder, then, if under such circumstances a little rheumatic or gouty pain or discomfort is prolonged indefinitely, exaggerated, and often increased by an active treatment which ought never to have been adopted? Every surgeon who has had a large experience of diseases of the tongue, especially in private practice, will at once recall instances of this kind, and will, at the same time, remember how very hard it is to cure them. The first duty of the consultant is to be sure that there is no essential difference in the appearance and feel of the two sides, except for such slight irritability on the affected side as is generally produced by injudicious active treatment. The symmetry or close resemblance of the two borders of the tongue should be pointed out to the patient and his medical adviser, and every means should be taken to relieve the mind of the patient of the suspicion of cancer. This is, unhappily, exceedingly difficult, for the fear, once raised, is not easily put to rest. Hence, more than half the difficulty of the treatment of the case. Soothing remedies, such as cocaine in lotion and ointment, with bromide of potassium internally, are indicated; and the prayer of the patient to have something *done* should not on any account be acceded to. Applications of caustic and of the galvano-cautery, excision with scissors, produce, so far as we are aware, no effect on the pain, which is much more deeply seated, and would not be referred to the surface of the tongue if the papilla had not been discovered. Of course, any cause of referred pain, such as carious teeth, should be sought for and dealt with.

A case of isolated lingual neuralgia was brought to Butlin by Dr. Sawtell, of Stroud Green. It is worthy to be recorded, because it is typical in its kind. The patient was a lady, sixty-seven years of age, who for the most part enjoyed good

health, but was of a somewhat irritable disposition and apt to "worry." She had, too, been rather out of health of late, but without exhibiting any decided signs of illness. About three months before, a pimple had formed on the tip of the tongue, not more on one side than the other, so far as could be ascertained. It was very tender, and lasted several days, much longer, in the opinion of the patient, than such pimples usually last. After its disappearance the tongue began to swell, or appeared to the lady to be swollen, for we could not discover that she or any other person had ever perceived any actual enlargement. The swelling lasted for a short period, then subsided. The sensation of enlargement only affected the right side of the tongue, and was not accompanied by pain or any other strange feeling. But since that time there had been many attacks of apparent swelling of the right side of the tongue, and with the feeling of swelling there had been pain and a feeling of stiffness. The attacks occurred at very irregular intervals, and lasted a very variable time, sometimes passing off in less than an hour, sometimes lasting for many hours, or even for a day or two. The pain was either aching or shooting, and was occasionally very severe, so much so that, if the attack occurred at night or lasted through the night, she was quite deprived of sleep. There were no premonitory symptoms of the attacks, nor did she know of any circumstance which was likely to induce an attack; and she had not discovered anything which would shorten the duration or diminish the severity of the pain. She pointed to the right border of the tongue from about the level of the last molar tooth, nearly as far forward as the tip, as the seat of the pain, and was quite sure that she had not experienced pain in any of the surrounding parts or in the cheek. The attack was not associated with any movement of the tongue. Between the attacks she complained of a slight feeling of discomfort in the right side of the tongue, but there was no tenderness or actual pain.

We examined her mouth with the utmost care, but could not discover any physical alteration in the tongue; nor could we discover any abnormality in any of the parts supplied by the fifth nerve. There was no pain at the time,

and she seemed in tolerably good health, but her friends said that during the attacks she looked very pale and ill, and could not take her food. The inability to eat appeared to be due to general distress occasioned by the pain, not to tenderness of the tongue.

We regarded the case as one of uncomplicated neuralgia of the lingual nerve, perhaps due to some alteration which had its origin in the pimple which had preceded the symptoms. Quinine internally, and menthol on the surface of the affected part, were prescribed, and she recovered speedily under these simple measures.

The *treatment* of lingual neuralgia may extend over many months before relief is afforded; but the records show that even the most inveterate cases may be cured. It is of the first importance to discover, if possible, the cause on which the pain depends. If the neuralgia is gouty or arthritic no local treatment is likely to avail; the general treatment will be most useful for the special pain. It is scarcely necessary to advise that in every case functional disturbance should be carefully corrected, and the general health should be improved, if necessary, with tonics and good food. But it will generally be found that, after every attention has been paid to the general health, and every functional disturbance has been corrected, the pain continues, often without the slightest diminution. Then the question will arise of local measures, and one after another of these will be adopted until relief has been afforded.

The treatment of the painfully swollen papillæ, such as described by Albert, has been mentioned,—excision and suturing is by far the best. Caustics and the cautery are very commonly used (Duplaix, Gazzola), but the possible consequences of such a scar must be faced. A woman has died of epithelioma arising in a scar caused by a drop of caustic potash; in another case by a drop of creasote; and, in many, an epithelioma has followed the use of the cautery.

(3) *Reflex*.—Besides this, all possible causes of referred pain in the tongue must be excluded. Carious teeth are doubtless the most frequent cause. But Hill mentions a case in which there was much pain and swelling of one-

half of the tongue, which disappeared when an aural polypus was removed. It was supposed that this had irritated the chorda tympani nerve.

But after the exclusion of all the cases of glossalgia which can be relieved because due to one or other of the above causes, there remain some in which the pain continues. It may occur in paroxysms, with intervals of ease, or may persist for considerable periods; it is much aggravated by eating, speaking, or even opening the mouth; the pain is shooting, grinding, or aching in character, and affects both lingual and glossopharyngeal nerves, or only one; it is nearly always unilateral. The above remedies having failed, some relief for the patient must be found, and this will be generally stretching or resection of the nerve. Except as a temporary measure, it will be wrong to treat the patient by narcotics. Demarquay says that he cured one patient, a strong man, by injecting morphia into the tongue on the affected side; but this cannot be recommended, at any rate in "neuropathic" women, for fear of inducing the morphine habit.

More reasonably, one may try repeated applications of the electric current in the course of the painful nerves. Of course, the treatment frequently disappoints expectations; still, no harm is done by trying before resorting to surgery.

(4) *Resection of the Lingual Nerve.*—This was first carried out by Hilton for neuralgia caused by epithelioma, in which he was followed by Moore. Roser, Vanzetti, and Lucas were among the first to operate for simple neuralgia.

Hilton drew the tongue forwards and to the opposite side, then he divided vertically with a small knife the mucous membrane and submucous tissue opposite the molar teeth. The incision extended through the upper margin of the sublingual gland and the hyoglossus muscle until the lingual nerve was exposed, when it was seized with forceps and divided by scissors. Moore modified this operation by making an incision from the last molar tooth downwards and backwards towards the angle of the jaw. The alveolar ridge is felt for as it begins to ascend into the coronoid process. Behind and below, and about half

an inch from the last molar tooth, and parallel to the ridge, is the lingual nerve. Roser cut out two or three lines of the nerve, Vanzetti two centimetres. Clement Lucas stretched the nerve. He pointed out that by well drawing out the tongue to the opposite side the nerve was made to stand out as a firm band beneath a fold of mucous membrane. Thus the nerve can be fixed by passing a sharp hook beneath it, the mucous membrane divided, and the nerve isolated and stretched by an aneurysm needle.

The foregoing method, employed by Lucas, will generally be suitable for simple neuralgia, but it is doubtful whether stretching should be done. The removal of a short piece from the nerve will prevent union and recurrence of the pain (Dubrueil, Bristow). When the nerve opposite the last molar tooth is obscured by the growth it will have to be reached further back. An incision is made through the mucous membrane, between the last molar teeth of the upper and lower jaw. The space between the internal pterygoid muscle and the ascending ramus of the lower jaw is entered by the finger, which feels for the spine at the entrance to the inferior dental foramen. The nerve runs forwards and downwards just internal to this point, and is drawn forwards on a hook and a piece cut out. It has been objected that such a wound may become septic. Walsham says that he has done this operation a number of times, and that the danger from septic infection is mythical. If, however, an external incision be preferred, the nerve is reached by trephining the ascending ramus or by deepening the sigmoid notch between the condyle and coronoid processes.

I. A. (c) Paræsthesia, Imaginary Ulceration.

Closely allied to the "neuropathic" form of neuralgia, and occurring in the same sort of patients, is felt an abnormal sensation as of ulceration, which makes the patient consult a practitioner under the impression that she has cancer or at least an ulcer of the tongue, whereas on examination nothing abnormal can be seen. Verneuil compared this abnormal sensation with that which causes a woman to imagine that she has a tumour in the breast. Later on a distinct general

nerve lesion may declare itself. One of Verneuil's patients died of general paralysis, and one of Fournier's became tabetic.

Abnormal sensations appear in the tongue after epileptic fits during the stages of stupor.

I. B. Disturbances of Taste Sensations.

Disturbances of taste are entirely connected with disease of the central nervous system. It is evident that there are taste fibres in all the afferent nerves of the tongue—the lingual, the chorda tympani and nerve of Wrisberg, the glossopharyngeal, and even in the branches to the base of the tongue from the superior laryngeal branch of the pneumogastric. The course of these fibres, whether to nuclei at the base of the brain or to a higher centre in the cerebrum, and the connections these nerves have outside the skull, are as yet not known with certainty. Conjectures on the subject are found in physiological text-books, and the cases supporting the various theories in books on diseases of the nervous system.

(1) *Ageusia*, or loss of taste, may be caused by cerebral tumours and other nervous diseases. There is a loss of taste in facial paralysis, owing to the involvement of the chorda tympani, whilst there is no loss of common sensation (Claude Bernard.)

(2) *Hypergeusia*, or excessive acuity of taste, is met with in the nervous derangements called hysteria, hypochondriasis, in ecstasy, catalepsy, and somnambulism.

(3) *Parageusia, or Perversions of Taste*.—Insane people have illusions and hallucinations regarding taste. After an epileptic fit there may be an earthy or other abnormal taste. It occurs in hysterical conditions bordering on madness; there is a distaste for ordinary food and a tendency to eat disgusting substances—pica.

Besides this, in all affections of the mouth, stomach, liver, intestines, there are perversions of taste.

I. C. Vasomotor Disturbances.

In some cases of trigeminal neuralgia the tongue has been swollen and œdematosus on the same side, apparently from vasomotor dilatation. In a case mentioned by Lewis this dilatation was produced reflexly, by the application

of chromic acid to the external auditory meatus. On repeating the chromic acid application the œdema occurred on the hands and feet, and not on the tongue.

Œdema of the tongue is also an accompaniment of myxoœdema, and in a case noted by Kirk the œdema of the tongue was made much worse by contact with *primula obonica*, to the irritating properties of which plant upon some people attention has often been drawn.

I. D. Disturbances of Muscular Sense.

The tongue is the seat of muscular movements of articulation, and it preserves the memory of these movements; hence it is, e.g. that deaf-mutes can be taught by graphic methods to speak plainly. In nervous diseases, therefore, where this sense tends to become lost, the failure to articulate plainly may be out of proportion to the amount of muscular paralysis.

II. A. Paralysis, or Glossoplegia.

Paralysis of the muscles of the tongue may be unilateral or bilateral. When one side only is affected, the symptoms of paralysis may be so ill marked that it is not always easy to be sure that there is truly complete loss of power in the muscles of the affected side. The tongue is protruded towards the paralysed side, owing to the unopposed action of the muscles on the sound side. Sometimes the deviation of the tip is so slight that it can only be affirmed after the tongue has been repeatedly thrust out. When the tongue is at rest, or is merely moved within the interior of the mouth, no abnormality may be discerned, or the paralysis is shown by one side being softer and less prominent.

When both sides are completely paralysed, the tongue lies at the bottom of the mouth as an inert mass of flesh, or sometimes seems to shiver or tremble, owing to fibrillar muscular contractions. In the latter case, its surface is often wrinkled; and in both cases the entire tongue by-and-by becomes smaller, undergoing the atrophy which invariably follows complete muscular inaction. As might naturally be expected, speech and mastication are seriously impaired. Speech is, in fact, quite unintelligible (articulatory glossoplegia); and mastication is imperfect, not on

account of impaired action of the jaws, but because the food cannot be moved about in the mouth or kept between the teeth. Even swallowing cannot be properly accomplished without some assistance; unless the bolus of food is thrust into the pharynx with the finger, it is apt to remain on the back of the tongue, and perhaps regurgitate into the front part of the mouth (masticatory glossoplegia). Hence, as mentioned before, fur tends to collect on the paralysed half or whole of the tongue, owing to the absence of the actual friction. When both sides of the tongue are affected but the paralysis is not complete, the terms articulatory and masticatory glossoplegia appear to be much more justified than when the paralysis is complete; for in some partial paralyses speech suffers most, in others mastication is chiefly impaired. In partial articulatory glossoplegia speech is intelligible, but many of the sounds are indistinct, the following letters and combinations of letters being especially difficult to express with clearness: s, sch, l, e, i, alsh, g, r, u, w.

Glossoplegia forms a symptom of some nervous diseases. Thus it may be one of the earliest symptoms of general paralysis of the insane, the speech of the patient becoming thick and difficult, and the patient shows bilateral paresis of the tongue; or it may appear late, when bulbar paralysis is added to spinal paralysis, such as progressive bulbar paralysis or amyotrophic lateral sclerosis. It is seen in the course of epilepsy, and although a rare hysterical condition, hemiparesis of the tongue has been seen with hysterical hemiplegia. It is very rare after general intoxications not complicating diphtheria or mercurial poisoning, but some cases have followed lead poisoning and also typhoid fever.

But more definiteness attaches to those lesions which, attacking the nerve-root or trunk, give rise to paralysis, and subsequently to muscular atrophy. And although the causes of these affections may be bilateral, they are far more often unilateral, and therefore the subject may be spoken of as hemiparesis or hemiatrophy of the tongue whilst mentioning the less common bilateral cases. A valuable paper by Dr. Trevelyan, of Leeds, should be consulted.

Hemiparesis and Hemiatrophy of the Tongue.—This

may be due to disease of (*a*) the hypoglossal nucleus, (*b*) the nerve root, and (*c*) the nerve trunk beyond the skull.

(*a*) **Nuclear.**

(1) *Apoplectic*.—Unilateral or bilateral paralysis of the tongue accompanies cerebral haemorrhage when the bulb is directly affected. In aphasia, etc., of purely cerebral origin the muscle does not degenerate. Hughlings Jackson, in 1872, described the case of a man, aged fifty-two, who while recovering from hemiplegia had paralysis of the tongue, and the tongue subsequently atrophied. There was no laryngeal palsy, and the remains of a haemorrhage was found in the left olfactory body. Hirt, in 1885, described a woman, aged seventy-six, who had a slight apoplectic seizure, momentary unconsciousness, and loss of speech for half an hour, which later continued impaired. There was also impairment of swallowing and of laryngeal adduction. The right half of the tongue was paralysed.

Eskridge and Rogers, in 1896, examined, post-mortem, a patient who had had paralysis of the right half of the tongue, and they found a haemorrhage in the situation of the nucleus of the nerve in the medulla.

(2) *Degenerative*.—This is a lesion to which a good deal of interest attaches, because of the associated paralyses which occur. Along with glosso-hemiplegia there occur unilateral laryngeal paralysis, paralysis of the soft palate, unilateral paralysis of the sternomastoid and upper part of the trapezius; also unilateral facial paralysis, or paralysis of eye muscles of the same side. Along with hemiparesis of the tongue one or more of these other paralyses are associated, owing to the degenerative lesions attacking the various groups of nuclei which lie beneath the floor of the sylvian aqueduct and fourth ventricle as far as the upper part of the spinal cord. Naturally, if the degenerating lesion is limited, it will involve the hypoglossal nucleus only, but by extension downwards into the upper part of the spinal cord it may include the nuclei of the spinal accessory nerve, going to the sternomastoid and trapezius, and upwards may spread below the floor of the fourth ventricle to the region of the fovea where originate those fibres which

join the pneumogastric trunk, and go to form the recurrent laryngeal nerve and the pharyngeal motor fibres to the superior constrictor and levator palati.

Numerous cases of these associated unilateral paralyses have been shown at the clinical meetings of the Laryngological Society of London, in which one vocal cord is paralysed with the soft palate of one side, half the tongue and sternomastoid and trapezius of the same side.

Others have noted unilateral eye or face palsies. The common degenerative lesion is tabes, a syphilitic history being also generally recorded; exceptionally, the lesion is due to lead. Syphilis alone, apart from causing nervous degeneration, generally attacks the roots.

Hughlings Jackson, in 1864, first noted the association between lingual and laryngeal palsy, in some as the only lesion, in other cases with muscular paralyses, involving the upper extremity. Besides, the patients showed the general signs of tabes. Stephen Mackenzie mentioned eight cases with hemiparesis of the tongue, half of the palate and the vocal cord; in two of these the sternomastoid and trapezius were also involved. In Peto's case, besides the hemiparesis of the tongue, the only evidence of tabes was the complete absence of knee-jerk. In a case under Ross the hemiparesis of the tongue was accompanied by paralysis of the third nerve of that side. As in others, there was in this case also a syphilitic history.

Lead as a cause of paralysis of the tongue is recorded by Remak. The patient, a man aged forty-three, a worker in lead, had wrist-drop with paralysis, right hemiatrophy of the tongue, the pupils did not react to light, and there was some limitation of movements of the eye to the right. Also, there was paralysis of the right posterior crico-arytenoideus and thyro-arytenoideus muscles. The patient was addicted to alcohol, there were no signs of tabes, and the knee-jerks were present. This seems an exceptional case.

Positive evidence of the position of these degenerating lesions has been found post-mortem in several cases. Among the earliest to do so were Raymond and Artaud, who found, besides characteristic tabetic lesions in the spinal cord, atrophy of the right hypoglossal nucleus; also of the

glossopharyngeal, pneumogastric, and motor nucleus of the fifth, whilst the rest of the bulb was sound. The right half of the tongue was a mass of fat cells, and many of the nerve fibres in the hypoglossal were degenerated. Koch and Marie also confirmed their observations by finding degeneration of the hypoglossal nucleus.

(b) **Of the Root.**

(1) *Tuberculous*.—A frequent and well-known cause of hemiparesis of the tongue is tuberculous disease of the occipito-atlantal articulation, followed by caries and necrosis. Trevelyan's case was a well-marked one. A woman, aged twenty-five, had marked atrophy of the left half of the tongue, pain and fixation in the upper cervical spine, tuberculous sinuses opening in the neck with scars, the result of other suppurating glands, dating altogether seven years. There was also loss of taste on the wasted side. An extension of the disease took place, involving the brain and cord, from which she died without showing any signs of involvement of other cranial nerves. The occipito-atlantal disease was confirmed post-mortem. The left hypoglossal nerve was found degenerated very extensively; the right hypoglossal and the lingual nerve on each side were normal.

(2) *Syphilitic* disease may also involve the nerve-roots. It may be due to inherited syphilis, as described by Turner. A girl, aged five, had atrophy of the right side of the tongue, with paralysis of the soft palate and larynx, epileptiform attacks, loss of power in the right arm, and atrophy of both optic discs. All this pointed to a syphilitic inflammation of the meninges at the base of the brain, with the involvement of several nerve-roots.

Jacoby described a case of complete atrophy of the tongue with other nuclear symptoms. The patient had violent headaches, with vomiting, difficulty in swallowing and speaking, the tongue was deviated to the left, there was paralysis of the external and internal oblique muscles of the eye, optic atrophy, and enlarged glands in the neck.

Lewin was able to distinguish the involvement of the root from degeneration of the hypoglossal nucleus, for the left hypoglossal nerve was found involved in a guinma in

front of and in the anterior condylar foramen; there were also gummata at the root of the tongue, but the hypoglossal nucleus itself was healthy. The patient had had left lingual hemiatrophy, diminution of tactile sensation, and of sensation to heat and pain.

Holthouse reported paralysis of the sixth nerve and of the hypoglossal in a syphilitic subject—probably, from the history, a case in which the roots were involved.

(3) *Traumatism*.—The hypoglossal nerve is involved by injury, fracture, or dislocation of the atlas. Sir James Paget described the case of a young man who fell on his head, and had afterwards paralysis and wasting of the right side of the tongue. An abscess formed, dead bone was removed, and the patient recovered.

Morrison saw a girl, aged sixteen, with paralysis of the right half of the tongue. She was jumping a ditch when she felt the upper part of her neck strained. Eighteen months later there was marked atrophy, with some difficulty in speech, but improvement was still going on.

The illustration (Fig. 36) is from a case of Barlow's, a boy, aged seven, who, when four and a half, was thrown out of a wheelbarrow and injured his cervical spine. The right half of the tongue was atrophied, but it still showed fibrillar tremors. The soft palate and probably the vocal cord of the same side was paralysed, but there was no injury to sensory nerves.

(4) *Hydatid Cyst compressing the Roots*.—This is a rare cause of hemiparesis and hemiatrophy. Choisy, in 1833, described one which compressed the hypoglossal, spinal accessory, pneumogastric, and glossopharyngeal nerves, producing atrophy of one-half of the tongue. Trevelyan mentions Dupuytren's case, in which a hydatid cyst had inserted itself into the anterior condylar foramen.

(5) *Aneurysm*.—An aneurysm connected with the vertebral artery has pressed upon the nerve, causing paralysis and atrophy.

New Growth.—Several cases are mentioned in which a new growth has involved the nerve. One of the most interesting was Hughes Bennett's case. Not only was it an instance of the obscurity attending the development of

metastatic cancer, but also it occurred on both sides. A woman, aged fifty-four, had had a tumour removed from the breast eight years before. She developed paralysis and atrophy of the tongue, which exhibited the reaction of degeneration. The facial nerve was also involved. At the



Fig. 36.—HEMIATROPHY OF THE TONGUE FOLLOWING AN INJURY TO THE CERVICAL SPINE.

Reproduced by kind permission of Dr. Thomas Barlow.

post-mortem numerous patches of degenerated bone due to malignant disease were found within the cranium, varying from the size of a pea to a shilling.

(c) **Of the Trunk.**

(1) *Traumatic.*—The nerve has been injured by a bullet which entered the occipital region (Schiffer). Hyde Salter relates the case of a man who was stabbed in the neck. The carotid and hypoglossal were divided, and left hemiatrophy followed. Bernhardt records that in attempting suicide a man divided his hypoglossal.

Hemiatrophy followed, in a girl, aged eleven, a fall upon

a spike, which left a scar behind the left ear (Babinski). A young man received a bullet in the cheek at the intersection of a vertical line drawn through the outer angle of the orbit, and a horizontal one through the lower margin of the nostril. With the paralysis of half the tongue he had some locking of the jaws, loss of taste, but not of common sensation. The movements of the jaw were recovered, speech remained blurred when hurried, and marked atrophy of half the tongue took place (Moger). Hutchinson had a case in which a punctured wound had been made behind the angle of jaw and the great cornu of the hyoid bone could be felt in the bottom of the wound. There was complete paralysis of the half of the tongue.

(2) *Inflammatory*.—The nerve may be involved by enlargement of glands, such as occurred in Birkett's case from mumps. A man, aged twenty-three, had hemiatrophy of the tongue on the right side, showing the reaction of degeneration, loss of taste on the same side, paralysis of the soft palate and vocal cord on the right side, and the right pupil was smaller than the left. There was a firm, smooth, immovable infiltration close to the anterior border of the right sternomastoid at the level of the angle of the jaw. A firm pressure on the tumour caused immediately redness and sweating of the right half of the face and ear, whilst such dryness of the throat was produced that the patient could not speak for a few minutes. It had all dated from nine years before. Whilst convalescing from mumps he caught a cold and the swelling formed, and with it the hemiparesis of the tongue commenced, causing him to have a difficulty in sounding his r's. He had first noticed the redness and sweating on pressure five years ago. This was an instance of the involvement of the hypoglossal, also the vagus and sympathetic, in the upper part of the neck.

A malignant growth in the neck may also involve the hypoglossal nerve.

The review of the various causes of glossoplegia, whether, as usually, unilateral or, occasionally, bilateral, shows that generally speaking the paralysis cannot be prevented from going on to atrophy, except where a syphilitic lesion of the roots can be treated, or some surgical measures undertaken.

II. B. Tremor.

Tremblings accompany a number of nervous maladies—epilepsy, general paralysis, paralysis agitans, disseminated sclerosis, exophthalmic goitre, alcoholic, mercurial, and typhoid intoxications. It is also a phenomenon of old age. Small oscillations or fibrillar movements are very common when half the tongue has undergone atrophy.

II. C. Spasm, or Cramp of the Tongue.

Spasm, or cramp of the tongue, is more commonly a symptom of some general nervous condition, but less frequently an idiopathic spasm is met with which appears the main feature.

(1) *Spasm of the Tongue connected with General Conditions.*—The tonic spasms are the least frequent, occurring in hemiplegia followed by contracture, with secondary degeneration of the nerve fibres in the pyramidal tract. It is also seen in catalepsy, and in hypnotism produced by excitation of the acoustic or lingual nerves.

Clonic spasms are more common, and especially occur in general epilepsy, forming an important part of the fit. But they have been produced by a focal lesion, such as an abscess, etc., affecting the third frontal convolution. In the epileptic fit the tongue is forcibly protruded just before the closure of the jaw, and is thus in danger of being bitten. Clonic spasm occurs in the hysterical fit, but the tongue is not injured because it is retracted when the convulsive closure of the jaw occurs. It must be remembered, however, that spasm of the tongue may form the chief or sole phenomenon of epilepsy. The automatic muttering of certain epileptics is of a spasmodic nature. In chorea the irregular movements of the tongue are well marked, causing words to be jerked out or blurred altogether. In Thomson's disease, which is characterised by muscular rigidity coming on with muscular movement, the movements of the tongue at the commencement of an attempt to speak are slow and hesitating, and only become freer after some seconds, yet the patient cannot speak rapidly when he has to accentuate his words. In paramyoclonus multiplex of Friedreich the muscles of the tongue, along with those of the face, are the subject of fibrillar twitchings, the convulsive movements of

the tongue being sometimes so intense that the patient holds the tongue with his fingers. It is the twitching which interrupts speech.

In various conditions of trismus, such as tic-doloreux, the tongue may be involved.

(2) *Idiopathic Spasm or Cramp.*—All authors are agreed that isolated hypoglossal cramp is an extremely rare affection. In spite of its rarity, several varieties are described; by some persons it is divided into articulatory and masticatory; by other persons into tonic and clonic. None of these terms appear to be quite applicable to the chief types of spasm or cramp, unless it be the term articulatory; and, on the other hand, these terms do not cover all the principal varieties of spasm of the tongue. We prefer, therefore, not to limit ourselves to them, or, indeed, to any special terms, but rather to describe and discuss the conditions of cramp or spasm which have been observed.

One of the most usual forms of hypoglossal cramp is that in which *the tongue is protruded involuntarily, and in spite of the earnest desire of the patient to prevent it.* The protrusions take place after longer or shorter intervals. The spasm is, for the most part, independent of the acts of speaking and mastication and swallowing; it is neither produced by them, nor does it prevent them from being performed, unless at the moment when the spasm is most powerful. In some instances, however, the spasm is induced or exceedingly aggravated by these acts. Between the actual attacks the patient may be quite well, but there is often a feeling of fatigue after the attack is over, and sometimes the patient is altogether indisposed. The attack may consist of a mere protrusion of the tongue, which is kept out for a short period, and perhaps turned a little upwards, or the tongue may be rapidly protruded and withdrawn many times in succession. The latter condition has been observed more often than the former. There is usually no pain in the tongue, either during or between the attacks, nor is there any swelling or other physical abnormality. The affection has been noticed more frequently in women than in men, but as often in women of fifty years of age or older as in young persons. In one or two instances the attack

has been preceded by premonitory sensations, and after these sensations have lasted for about a minute, the actual spasm has commenced. The attacks occur during the night as well as in the daytime, and are so violent that the patient is awakened out of sound sleep. The attack has been so sudden and forcible as to cause at the same time a dislocation of the lower jaw.

As an example of the form of spasm in which the tongue is kept protruded during the whole of the attack, we cannot do better than quote a case recorded by Dochmann. The patient was a girl, nine years old, under the care of Professor Winogradow. She appeared to be a healthy child, and did not suffer from headache or from carious teeth, or any trouble about the tongue or mouth; but during the last five months she had been much distressed by involuntary protrusions of the tongue. The tongue was thrust out at tolerably regular intervals of eight to ten minutes, and remained protruded from eight to fifteen seconds. During the protrusion it was quite still, and was at first quite straight, but towards the end of the attack the tip was a little turned up. The attacks were more regular and troublesome during the day, but she was not exempt from them at night, when they often awakened her from sleep. They were not preceded by any premonitory symptoms, nor was there any abnormal condition during the intervals between them. The child said that she was suddenly seized with a great desire to protrude the tongue, and she could not prevent herself from doing it. If she kept her mouth closed with the hope of retaining the tongue within it, the tongue was thrust hard against the teeth so that she suffered pain; but when it was permitted to protrude from the mouth there was no pain, only a feeling of weariness, which ceased as soon as the spasm had passed off. Speech and mastication were affected only during the persistence of the spasm. In this case there was no history of neuroses, nor was there a family history of neuroses. The attacks appeared to be under the control of the patient only so far, that she could induce an attack of spasm by keeping the tongue out for a long time, and then suddenly withdrawing it; and the attacks of spasm were certainly more frequent when the child was

excited. So far as we are aware, Dochmann has not supplied the further history of this case, and we are not informed whether the patient recovered.

One of the most carefully recorded cases of rapid protrusion and withdrawal of the tongue is that described by Berger. In March, 1878, he saw the daughter of one of his colleagues, who was brought to him for advice. She was twenty-eight years old, delicately made and anaemic, but had never suffered from hysteria in any form. As an infant she had suffered from eclamptic attacks when teething, but they had ceased as soon as the teething had been accomplished. She had menstruated at fourteen, and had always been regular. In 1875 her right leg had been swollen and oedematous after a severe cold. These were the only ailments which could be remembered, and there was no family history of neuroses. On the 21st of October 1877, without any perceptible cause, and whilst in good health, she had an attack of spasm of the tongue, which was repeated four times during the same day. She remained free from any further symptom for eight days, and then had two attacks during the day and three in the night, which awoke her. For several months she was treated with quinine, and the attacks were very slight and infrequent, but she was not exempt from them. On the 15th of March, 1878, they occurred with great intensity both by day and night, and on that account she was brought to consult Berger. The attacks were of this kind: Without any pain in the head, and in the midst of the best of health, she suddenly felt a peculiar, disagreeable, yet not painful, sensation of tension above the larynx, beneath the chin, then a feeling as if the tongue was swollen and filled the entire mouth, a wavering in the tongue, the sensation as of "a wave-like movement running from behind forwards." These peculiar sensations, which may be described as an aura, lasted from a minute to a minute and a half, then the tongue was involuntarily and unconsciously thrust out and withdrawn with great force and in rhythmic spasms, numbering some fifty or sixty in a minute. It projected in a straight line between the teeth, but it was not thrust out to its full extent. The

attack lasted from one to two minutes, when the tongue ceased to be actually protruded, but the movements were continued for a few minutes within the mouth. If an attempt was made to prevent the protrusion by keeping the teeth firmly set, the tongue struck against them with an audible sound, and the spasm took place within the mouth. After the attack the patient felt weak, but no other abnormal condition was observed. Between the attacks the mobility and sensibility of the tongue were perfect, and no disease was discovered in any part of the mouth. Improvement followed the administration of iron, quinine, and belladonna, but the patient was not cured until she had taken the baths at Landeck, and had drunk the iron waters. From that time to the date of the publication of Berger's paper (1882) there had not been a return of the spasm.

A condition differing in some respects from the foregoing is described by Remak. The spasm was not confined to the muscles of the tongue, but the affection of the tongue was by far the gravest part of the patient's trouble, and the case may fairly be considered here. A man, thirty-three years old, who had never had syphilis or been the subject of any neuropathic trouble, was attacked, without known cause, by a peculiar sensation in the left half of the tip of the tongue, as if it had been scalded or had gone to sleep. There was no affection of taste and common sensation, nor was there any disturbance of motion. In about two weeks the peculiar sensation extended over the middle of the tongue, and was noticed in the inside of the left lower lip and the left gum. At the same time painless spasms of the tongue commenced, which gradually increased, were never quite absent, and distressed him in speaking and, still worse, in eating. At the end of four weeks his condition was as follows: There was slight paresis of the portion of the facial nerve which supplies the muscles round the mouth, but with this exception, none of the cranial nerves except the hypoglossal was affected. When the mouth was opened a rhythmical play was observed of the movements of the tongue, which, still lying at the bottom of the mouth, was pushed forward and withdrawn forty or fifty times a minute.

With every complete spasm there was diminution and flattening of its surface, and there were corresponding rhythmical contractions of the muscles attached to the lower jaw and hyoid bone, particularly the geniohyoid muscles. The tongue was not thrust so far forward as to touch the teeth, so the spasm was not so violent as in some of the other cases; but it was worse when the tongue was held down with a spatula, and when it was protruded. It was not made worse by speaking, but the speech was a little thick and slow. *It was decidedly increased by drinking, and still more by eating;* so bad was it when he chewed, that he had frequently bitten the left side of his tongue, and was not seldom obliged to spit out his food. At times the spasms increased in intensity, and extended to the muscles of the lower part of the face on the left side. When the attack was at its climax he felt faint, and could neither eat nor speak.

A very careful examination was made of the interior of the mouth and neighbouring parts, but, with the exception of chronic pharyngeal catarrh, there was nothing abnormal. The teeth were fairly good. No facts of importance were revealed by an electrical examination.

Iodide and bromide of potassium were administered, and the constant current was used every day in the infra-maxillary region, the left side, and back of the neck. The attacks speedily diminished, and in eight days had ceased. Gradually the peculiar sensations vanished, and in three weeks the patient was quite well, with one slight exception, the paresis of the orbicular portion of the facial nerve persisted.

Remak regards this as a good example of masticatory hypoglossus cramp.

In the cases thus far related, the cramp or spasm was either constant or occurred at regular or frequent intervals; it was, in two of the cases, certainly, capable of being excited or exaggerated by certain acts, in one instance, especially, by the act of chewing and of swallowing, but it did not depend on any action or attempted action. There is, however, a variety of cramp, differing widely from that which has been described, in which *the muscles are thrown into convulsive movement only by a certain action, or by the*

attempt to perform a certain action. No better example of this can be adduced than that which is recorded by Vallin. An intelligent boy, between six and seven years of age, was greatly frightened during a performance at a travelling booth or circus, so greatly, indeed, that he was unconscious for a short time. On the following day he could not speak. Whenever he tried to do so there was a feeling of constriction, a tonic convulsion in the throat and the entire hyoid region, and his tongue was tightly applied to the roof of his mouth. He made strenuous efforts to overcome the spasm by which his tongue was fixed; his face reddened and his lips moved spasmodically, but the effort was in vain. He could swallow without the slightest difficulty, and every other act in which the tongue takes part was performed with ease and smoothly. The child's intelligence remained unaffected, and his health was as good after as before the alarm which had deprived him of speech. There was no family history of neuroses. One fact is worthy of notice; the tonsils had been enlarged for a considerable period, and had been cauterised at intervals. The possible importance of this fact will be referred to presently. The child slowly recovered without any special treatment at first; and when the power of speech had in some degree returned, he was made to recite every day until he was quite well.

This variety of cramp is not so infrequent as the other varieties; it is recognised under the term "articulatory hypoglossus cramp." It is also termed aphthongia (*alalie par trouble de la motilité de la langue*).

In these cases will be found the types of all spasmodic affections of the tongue. Individual examples may present slighter or more marked deviations from them, but it is not necessary to enter into all these deviations. It may be seen that, although these cases are regarded as examples of pure isolated hypoglossal cramp, the cramp or spasm was not always strictly limited to the muscles supplied by the hypoglossal nerve. Nevertheless, the muscles of the tongue, especially those supplied by the hypoglossal nerve, were so much more affected than any others that the term "hypoglossal cramp" is quite justifiable. In considering the

nature, the pathology, and treatment of these affections, it is desirable to separate, as far as possible, the variety of cramp which is produced by attempts at speech from that which is independent of every act of the patient, or so nearly independent that it cannot be solely or chiefly associated with any act.

The independent cramp may, as has been already stated, and as has been illustrated by the examples which have been given, assume different forms. But the essential features were the same in each form: the tongue was protruded and withdrawn without any definite object and without performing any useful or reasonable purpose, and without any attempt to do so. All the ordinary acts in which the tongue takes part were performed smoothly and without a special effort, provided there was not any actual spasm present at the time they were attempted; except in one instance, in which the acts of chewing and swallowing were attended with great difficulty, and were at times impossible. But in that instance the tongue appears never to have been quite quiet; the paroxysms of spasm were induced by taking food, but they were not wholly dependent on the taking of food. In the other cases the spasms or cramp were involuntary, and were, for the most part, absolutely beyond the control of the patient, who was neither able to prevent nor to induce them.

It is impossible, at the first sight, to resist the impression that the affection is hysterical, and that the convulsive movements of the tongue might be prevented by a strong determination on the part of the patient. Jolly has drawn attention to the muscular contractions which affect the tongue in hysterical persons, sometimes twisting and distorting it, at other times suddenly protruding it, or suddenly withdrawing it when the patient makes an attempt to keep it out, and at other times preventing or impairing the power of speech and swallowing. The absurdity of the gesture or grimace produced by the spasm, and the similarity which it bears to those made by children or rude persons, almost prevents one from taking a serious view of the affection. But a dispassionate analysis of the published cases proves, we think, that although there may be, and probably are,

hysterical cases of spasm of the tongue, resembling in most respects those which are dependent on disease, there are also spasmodic affections of the tongue which are as certainly dependent on disease. Thus, though most of the patients were women, the affection is not unknown among men. One of the cases we have quoted was the case of a man, and Berger has related the case of a merchant, forty-two years old, strong and healthy-looking, without any appearance denoting nervousness of any kind, who had been for two and a half years troubled, at longer and shorter intervals, by involuntary protrusions of the tongue, which happened not infrequently at night and woke him out of sleep. The very fact of the occurrence of the contractions during sleep is opposed to a hysterical origin. Of the female patients, some were children or old persons, neither of whom are nearly so liable to hysterical affections as young and middle-aged persons. Children of eight and ten years certainly are not exempt from liability to hysteria, but they are not often the subjects of hysterical affections. Further, similar convulsive movements to those of pure hypoglossal cramp occasionally occur as part symptoms of grave affections of the central organs of the nervous system.

It is probable that the *seat of the disease* may be either peripheral or central. Very few of the cases which have been published of pure, or almost pure, hypoglossal cramp occur in English medical literature, but one of the few appears to be an example of cramp depending on a peripheral cause. It is as old as 1813, and is recorded in the Transactions of the Medico-Chirurgical Society, by Mitchell. The patient was a woman, fifty years of age, and the spasms affected the tongue, the jaw, and mouth. They were thought to be due to the condition of her teeth and gums: the two incisors on the left side and the canine were broken off, the two bicuspids and three molars were carious, the gums were inflamed and irritable, and there was a discharge of fœtid matter from the parts about the decayed fangs. The muscular contractions were chiefly on the side on which the teeth and gums were diseased. The carious teeth and stumps were removed, the gums were scarified, and from that time she began speedily to recover. The theory of a

central origin is difficult to prove, for so far as we are aware, it does not rest on any post-mortem examination. But Remak suggested that the disease may be a form of partial cortical epilepsy. He pointed out that Hitzig produced spasms of the tongue and of the muscles surrounding the mouth by irritating the crossed cortical region (right side) in the lower segment of the anterior central convolution, and that Munk produced complete paralysis of the same groups of muscles by removal of the same limited portion of the cortex. In confirmation of Remak's theory, it must be mentioned that there was a distinct aura in one instance, and that another of the patients was conscious of an intense desire, which may be regarded as in some sort an aura, to protrude the tongue. Against the epileptic theory it must be admitted that recovery from the disease has occurred in almost all the cases which have been watched for a sufficiently long period, and that the cure was not the effect of any of the usual remedies for epilepsy. An absolute judgment on this point must be suspended until the matter has been proved by post-mortem examinations, and it may be long before sufficient opportunities present themselves. It is not difficult to understand that an irritation which affects the hypoglossal centre, whether at the cortex or more deeply, may produce such convulsions of the tongue as those described.

The *prognosis* of independent spasms of the tongue is undoubtedly good, but the cure may require a long time and the exercise of much care and judgment. The tongue itself, and all the structures in the interior of the mouth, as well as the adjacent cavities, must be carefully examined to see if there is any disease which can produce reflex irritation of the hypoglossal. Stumps of teeth must be removed, and carious teeth stopped, if possible, or removed; and ulcers of the mouth and other neighbouring parts must be cured as speedily as possible. But in the greater number of cases it is probable that no reflex cause will be discovered, and the treatment will be general rather than local. The question of hysteria may be raised in any case, whether there is a reflex source of irritation or not, but it will be raised especially in cases in which no irritative source is

apparent, and in which the patient is a female and young. The diagnosis of the real disease will depend on the absence of associated symptoms of hysteria, and by observing that the muscular contractions are much more regular and orderly than those which usually occur in hysteria. In hysteria the spasms are seldom so restricted to certain muscles, or groups of muscles, as in disease, and it is more common to find that the spasms are associated with hindrances to speech and chewing and swallowing. In most cases it will be well to have the patient very carefully watched, that the difference, if there is any, in the spasms at different times of the day, and under various circumstances, may be known.

In treatment the means which have been most successful are such medicines as are likely to produce a soothing effect upon the nervous system or to improve the general health, with change of air or scene. Thus, quinine and iron, and belladonna and bromide of potassium should be given, according as one or other of them seems to be indicated by the general condition of the patient. In most cases rest is very desirable, with removal of the patient, as far as possible, from observation of those who are not necessary to the cure or comfort. In one instance electricity was employed, in the form of the constant current daily in the infra-maxillary region, the side and back of the neck. Whether as the result of this, or whether owing to the previously short duration of the affection (four weeks) and the administration of iodide and bromide of potassium, the spasms at once became less frequent, and in eight days ceased. It does not appear that a strong current was employed, so that one is inclined to doubt whether the galvanism exercised much influence on the course of the disease; but inasmuch as no harm is likely to arise from its use, and some good may be done by it, we should be disposed to use it in any case of hypoglossal cramp which comes under our care, unless there is a decided contraindication. It is not needful, in the large majority of cases of the kind we have been considering, to forbid speech, or to take special precautions in eating or in swallowing. But, as eating is exceedingly difficult in a few instances,

and as the taking of food by the mouth certainly induces or aggravates the spasms, fluid food or very soft substances should be given, and the question may be entertained whether it would not be desirable that the patient should be fed, chiefly or wholly, by the rectum. However, Remak's patient, who suffered from spasm during eating, more than any other of the patients whose cases we have studied, recovered remarkably quickly, although all his food was taken by the mouth.

The form of cramp which is associated with attempts to speak (articulatory cramp) differs widely from the independent cramp. In typical conditions of this affection the only act which is impaired is the act of speech. Chewing, swallowing, and all other acts in which the tongue takes part, are performed easily and smoothly. There are no troubles of motion or sensation, or of taste. The patients are not deficient in mental or physical power. But as soon as an attempt is made to speak, the muscles refuse to act in harmony; the tongue is "glued" to the roof of the mouth, and speech is impossible. The patient struggles to overcome the obstacle; his lips move spasmodically, his face is reddened, and sometimes there are convulsive movements of the muscles of the face and neck. But the effort is unavailing, and is soon abandoned. Articulatory cramp may last for a few weeks or months, and may be completely recovered from, or it may exist in a greater or lesser degree for many years, and, in such cases, is rather a form of stammering. Ganghofner mentions the case of a young man, nineteen years of age, who had from childhood suffered from spasmodic contractions of the muscles of the tongue as soon as he began to speak. He also had spasms of the muscles of the lower part of the face on the left side, and occasionally of the muscles of the right lower limb. He was anaemic, but otherwise sound, and nothing abnormal was noticed until he tried to speak. His condition was not nearly so bad as that of the boy whose case is related on a preceding page, for he could speak, although with difficulty. His cramp, too, did not affect him when he sang, or spoke very quickly, or declaimed pieces he had learnt by heart.

In a man, aged forty-five, the tongue was in its ordinary position in the mouth, but firmly nailed, as it were, to the floor. The left half was shortened, of stony hardness, bluish, and continually in waves (Lange).

Articulatory cramp is essentially an *affection of co-ordination*; the muscles of the tongue are put in action, but their action is no longer harmonious. Their several movements and the correlation of their movements are not evenly maintained and balanced. The condition may be compared with ordinary stammering, with aphonia spastica (in which speech is seriously impaired by the loss of co-ordination of the muscles of respiration and the muscles of the larynx), with writer's cramp and other similar affections. In Lange's case the brother of the woman had suffered from writer's cramp. She could push the tongue back into the mouth and close the lips, but shortly an irresistible impulse caused the tongue to be protruded again. The spasm was relieved by mastication. There is no evidence of central or peripheral disease: the patient may be, in every other respect, quite well; but it is only fair to add that in some of the recorded cases there has been defective health, either permanent or only temporary; thus, one of the patients was epileptic; in two instances the tonsils were enlarged. These conditions may have been merely accidental complications or associations of the cramp, and may have borne no direct relation to it; but it has been suggested that they not improbably indirectly influenced the strength and duration of the affection.

The *treatment* of articulatory cramp consists in correcting all obvious defects, whether local or general; treating or removing enlarged tonsils, ulcers of the tongue and neighbouring parts; relieving anaemia; treating epilepsy, etc. In the treatment of older patients, we believe the best means of attacking the affection itself is to forbid any attempt at speech for a period of from one to two months. It need scarcely be said that it is not easy to enforce silence for so long a time; but in the cases of male patients this has been done by sending the patient for a long sea voyage (a good thing in itself, if the man is not in robust health), and providing that all conversation shall be carried on during

the voyage through the medium of signs and writing. So long and complete a rest may be sufficient alone to effect a cure; but it is desirable that when use of the voice is permitted, it should at first be restricted to regular exercises, recitation, reading aloud, and such means as were employed successfully in the case already alluded to as recorded by Vallin. In the treatment of younger patients it is, of course, useless to attempt to enforce silence. If the patient can possibly speak, however difficult speech may be, it is probable he will at times attempt it. It is better to try and restore the harmony of the various muscles employed in speech by causing the patient to recite and read aloud, especially easy pieces, and pieces which he already knows very thoroughly.

The suggestions for treatment which are made here must be accepted merely as suggestions for general lines of treatment. It is more than probable that each case of articulatory cramp will require some modification of the general plan; but the number of recorded cases of successfully treated cramp of this kind, or even of articulatory hypoglossal cramp, whether treated or not, is so small that it is quite impossible to lay down any very definite method of treating the affection.

Lange's surgical treatment of his case is perhaps worthy of imitation, if under similar circumstances all medical means have been tried without relief. He first satisfied himself by experiments on dogs that it was the geniohyoglossi muscles which, by their spasmotic action, caused the protrusion of the tongue, and that the geniohyoids remaining intact after the division of the geniohyoglossi, the strongest faradic current would not produce sufficient retraction of the tongue to impair breathing. Thereupon, in the case already mentioned of a woman, aged forty-six, whose brother had suffered from writer's cramp, and who was herself suffering from spasmotic protrusion of the tongue, he made an external incision five cm. long, exposed the mylohyoid, and divided it in the middle line; he then carefully retracted the geniohyoids and so exposed the geniohyoglossi, which he cut away from the genial tubercles. The result was satisfactory; only once or twice did the patient awake at night

with difficult breathing, and have to sit up in bed. The tongue was retained within the mouth, speech was clearer, and mastication unimpaired. The patient was very pleased with the result, and the improvement continued nine months after the operation.

Gallebrani and Pancinotti found that the cause of articulatory spasm, difficult deglutition, and contraction of the left neck muscles, with rotation of the head, also slight twitchings of the lip, was a scar containing a potsherd, involving the great occipital nerve. All the labio-glossopharyngeal symptoms disappeared after excision of the scar and removal of the foreign body.

III. Trophic Disturbances.

(1) *Peripheral, affecting the Mucous Membrane.*—This has been dealt with in the chapter upon "Herpes of the Tongue."

(2) *Muscular Atrophy.*—This follows a lesion of the nucleus, root or trunk of the nerve, and does not follow higher lesions, e.g. those causing aphasia.

(3) *Muscular Hypertrophy.*—This is described under "Simple or Muscular Macroglossia."

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